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AVIATION

The Oldest American Aeronautical Magazine

APRIL 2, 1928 | Issued Weekly | PRICE 20 CENTS

An action picture of the Ireland "Neptune" going into a left turn.

VOLUME XXIV

NUMBER 14

Special Features

The Hall Engine
Aviation in Brazil
The Williams Monoplane

AVIATION PUBLISHING CORPORATION
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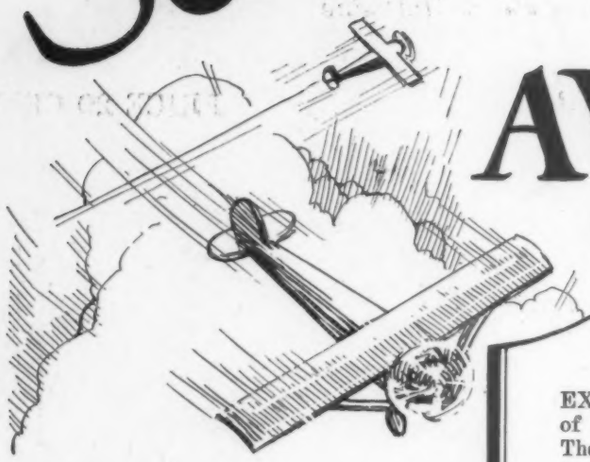

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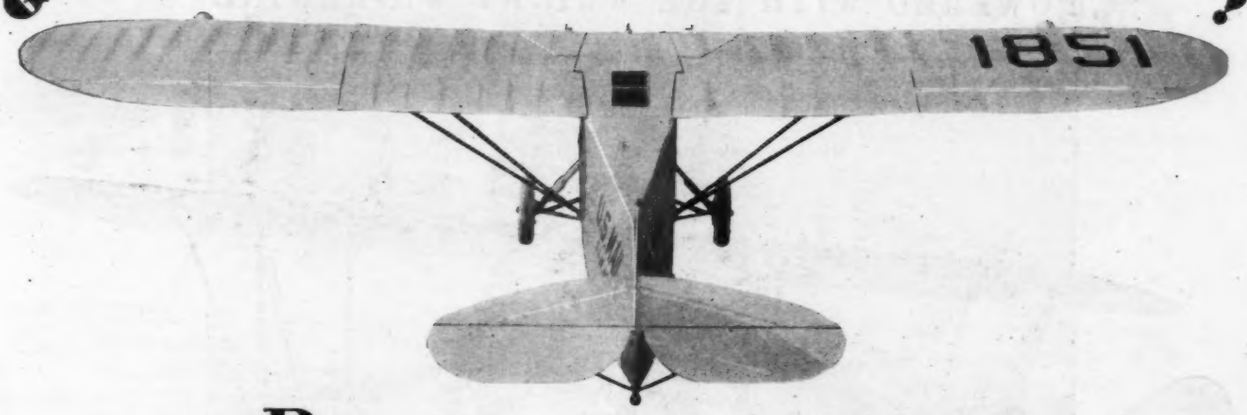

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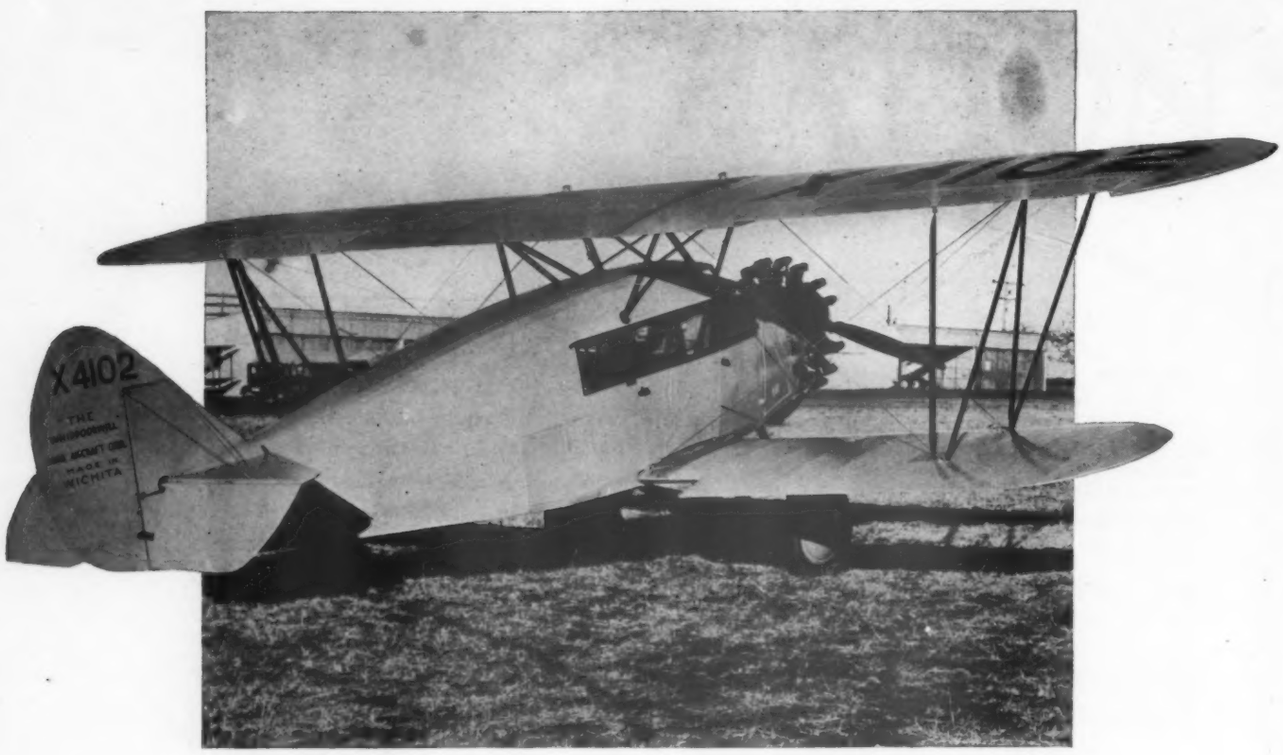

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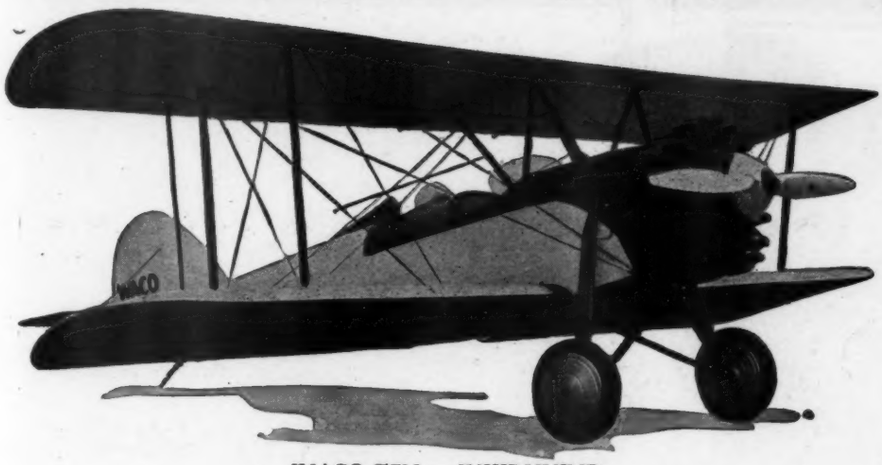

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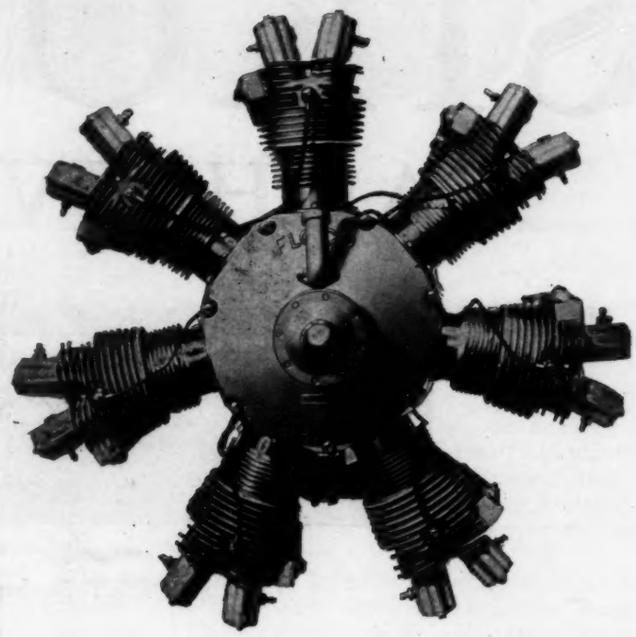

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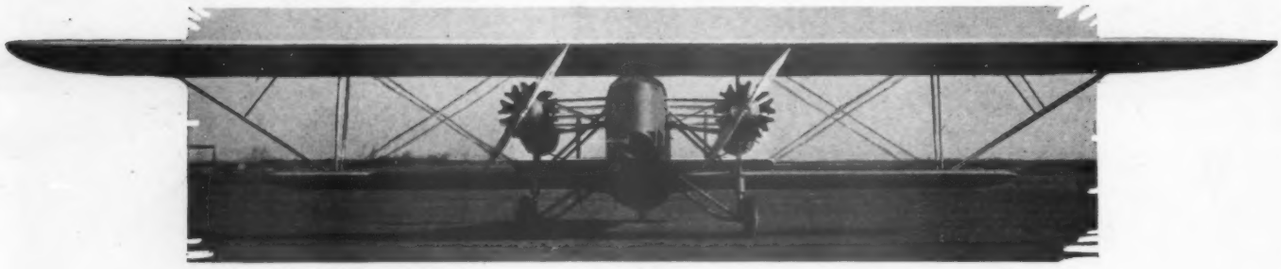

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AVIATION

The Oldest American Aeronautical Magazine

Vol. XXIV *APRIL* 2, 1928 No. 14

Choosing a School

WITH THE coming of good weather many young men will be choosing a flying school, and advice as to how to get training is timely but just as hard to give this year as it has been in times past. On the whole the larger schools probably give more effective training at a lower cost than do smaller schools. The fact that there are fewer students does not necessarily mean that they get more attention because the instructor may have a multitude of things to do besides instructing. In a larger school the instructor specializes on teaching and piles up a vast amount of experience. The larger schools also have the advantage that they have more equipment and that repairs to planes do not hold up the schedule. The airplane dealer who teaches as a side line may have had the experience in instruction but unless he receives good pay for his time he is likely to side track this end of his work at times.

If possible, it will certainly pay a student to go out and see flying instruction going on before he makes a choice. Be sure that the instructors have really had a good deal of experience in teaching. If the school has been established for several years in the same locality it is easy to check as graduates can be written to, etc. The condition of the equipment is perhaps a more important consideration than whether the school is new or not. Some of the best schools in the country still train on Jennies by preference, but they keep them in good condition. A school which never turns a pupil down as unable to learn how to fly is apt to be pretty short sighted in its policies. Many of the new schools are just as good, if not better, than the old ones, but there are also many of them that talk very big but really have not had the necessary experience. In regards to yourself, ground courses and outside work are a nuisance but they really help. Be sure that you can get enough time off so that you can go out to the field at least twice a week, oftener if possible. Do not leave long intervals when you do not visit the field or you will be wasting your time, and will have to learn a great deal over again. On the other hand do not try and crowd your work. There are few students who can take instruction and keep on learning for more than half an hour at a time or for more than an hour during the course of a day. It takes a certain amount of time to absorb things. It is highly advisable to take a medical examination before learning to fly; you may have defective vision and not be able to focus properly for landings. Do not start taking flying instruction unless you will have money enough to finish, and above all do not go to a flying school just because the course is cheap.

Airport Advertising

NOW THAT the development of the airplane has reached the point where it is receiving universal recognition as the coming means of transportation the old familiar term "flying field" is being dropped in favor of what is perhaps a more impressive and more expressive term...airport.

The term "airport" immediately suggests of a large expanse of level ground, beacons, floodlights, hangars, etc., whereas "flying field" merely indicates the presence of a few locally owned airplanes and a hangar or two. There are in existence today a great number of airports that really are airports in every sense of the word, but there are also some plots of ground that are called and advertised as airports when in reality they are nothing more than unused roughed surfaced farm fields. In fact a few of them are so full of ruts and humps that they could hardly be called emergency landing fields.

The almost overnight establishment of these "airports" is the result of their owners suddenly realizing the value of the airplane in business. From the standpoint of the man in the street that realization first came into being when Colonel Lindbergh made his famous flight from New York to Paris. Since that time practically every city and town in the country has made some sort of an effort to establish an airport and thus attract aviation to its door. Some have obtained expert assistance and advice while others have gone ahead recklessly, but all have worked with the same idea in view. To strive to encourage flying by the establishing of a location for flying operations is a worthy undertaking that is most helpful to the cause. But, for a city, town or individual to advertise the existence of an airport when such airport is little more than an uneven or swampy two by four plot of ground, is not only a misrepresentation of facts but to a certain extent it is unlawful advertising.

Airplane manufacturers have of late been severely criticised for statements contained in their advertisements and measures have been adopted to bring about the cessation of misleading airplane advertising. Such being so it seems only fair and logical that similar steps should be taken regarding the advertising of airports.

When the Department of Commerce completes its rating of airports and the listings are published, then will the cross-country pilot be able to ascertain what landing facilities are at the other end of his journey. But until that time it will be to his advantage to find out, either by asking pilots who have been there or some other way, just what to expect rather than take things for granted because the particular site to which he intends to fly is advertised as an airport.

The Hall Engine

New Six Cylinder Water Cooled Power Plant Weighs 700 Lb. Dry and Develops 300 Hp. at 1800 R.P.M.

The Hall six-cylinder aircraft engine has been developed by Harold Hall, aeronautical engineer for Beacon Airways Inc. Under production conditions the engine would cost approximately $2,500. Only one engine exists today and this is installed in a special Fokker Biplane which is being prepared to be flown by "Jimmy" Angel, and Presho Stevenson, vice-president of Beacon Airways Inc., from Fresno to Mexico City and then over South America.—ED.

By HAROLD HALL
Aeronautical Engineer, Beacon Airways Inc.

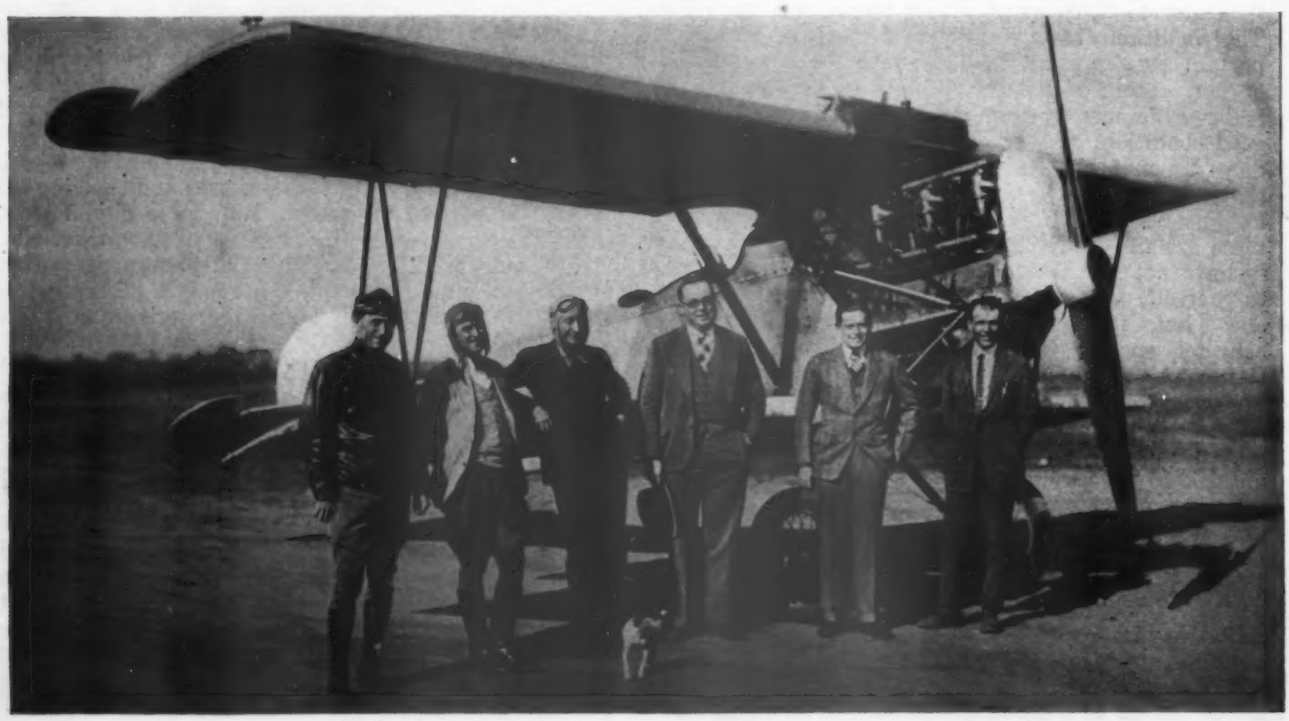
THE OUTSTANDING features of this new six cylinder, water-cooled engine are its adaptability to rapid replacement of parts, low production cost, maintenance cost, and long life. Special attention has been given to details, which makes it possible for the engine to carry a very high compression, thereby obtaining a low fuel consumption. The compression ratio is 6.25 to 1, and fuel consumption is .43 lb./hp. per hr. At 1800 r.p.m. it develops 300 hp. weighing 700 lb. dry. It has a bore and stroke 5 in. by 7.5 in. with a displacement of 884 cu. in.

With this engine "Jimmy" Angel has flown the special Fokker over a measured course near Fresno, at a speed approximately 200 m.p.h. This was accomplished after the Fokker wing had been rebuilt at a slightly different curve. The plane so powered has a cruising speed of about 150 m.p.h.

The cylinders are semi-steel castings, with water jacket cast integral. Twenty-four valves serve the engine. All are vertical in the head, which clearly facilitates machining. Each set of intake and exhaust valves operates alternately, permitting one to cool while the other operates. The six cylinders are served by two spark plugs each which are located on the intake side in such a position that the incoming gases flow over the plugs. This affords combustion, cools the spark plug points, adds life to the plugs, and prevents pre-ignition. The two openings at bottom of the water jacket, and centrally positioned openings at top of water jacket through which the water jacket core is supported, are also used for water inlets and outlets.

Approximately 200 gal. of water per minute flow through the cooling system under high pressure. The cooling system in fact is the foundation of the engine. This consists of the patented features of the cylinder, which are the two water inlets at the bottom of the water jacket, and the centrally located outlet at the top of thewater jacket between the four vertical valves.

A duplicate water pump is provided at the rear end of the engine and is driven from a gear between the cam shaft and crankshaft, ordinarily used as the idler. Particularly, the double water pump is comprised of separate pumps in one aluminum casting. It follows conventional design, with the



A group of Beacon Airways, Inc., officials in front of the Fokker plane fitted with the Hall engine. Left to right, J. R. Pucket, P. Stephenson, Jimmy Angel, Grant Du Bois, F. W. Hemingway and Harold Hall.

exception of being double, and is an ordinary centrifugal impeller type. The impellers are bronze castings and are interchangeable, which simplifies production. On account of the pumps being back to back, each pump has only one gland. Each gland can be packed without removing any parts. The water circulation is unusually fast, being 200 gal. per minute at 1550 r.p.m. of the crankshaft. The water when discharged from the pumps enters two distributing pipes double the area of the pump's outlet, and cylinder inlet. This reduces all possible friction, and therefore distributes the water equally to all cylinders.

The water enters the cylinder at the opening on each side, which gives a positive circulation at high velocity completely around the combustion chamber, spark plug bosses, valve seats and guides. This prevents any steam pockets from forming. The water is then discharged through a centrally located outlet on the top of the cylinder into a pipe equal to the area of the two pumps' outlets. The water distributing pipes and the water discharge pipes are interchangeable, which simplifies production. This whole arrangement of the cooling system, with the four valves and the position of the spark plugs as described, has made it possible to control the internal heat, which heretofore has placed a limit on the compression that can be carried. The internal heat has also been the cause of rapid loss of power, due to the valves coping and burning, rings losing their tension, and the points breaking off.

Four Valves Per Cylinder

Four tungsten steel valves are used in every cylinder. The advantage of using four valves per cylinder may be noted in the fact that the engine has a large valve arrangement using smaller valves than is the case when using a two-valve cylinder. The four valves cool better, and do not warp or burn as rapidly.

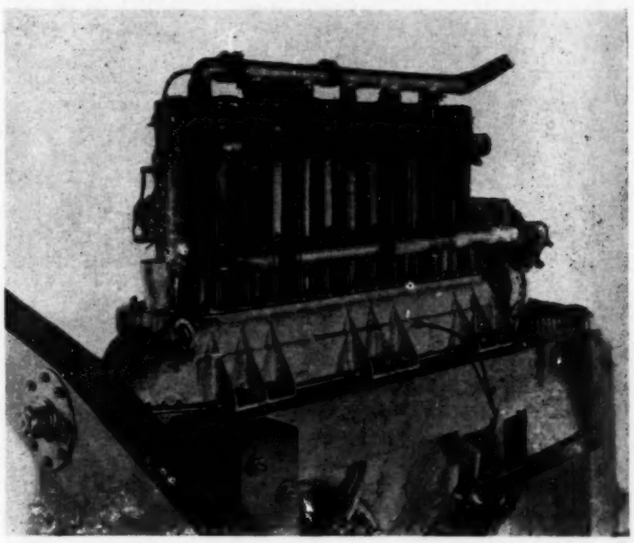
Each of the four valves is operated by an independent push rod and independent rocker arm. The cam shafts are located in the upper part of the upper half of the crankcase, two cam shafts being used, one on each side of the engine. One cam shaft is used to operate the exhaust valves, and the other separates the intake valves. The advantage of having the cam shafts in the crankcase over the overhead cam shaft is that you can remove the cylinders without first having to remove cam shaft and valve operating mechanism; it is also more economical with the use of oil and much cleaner. It also reduces maintaining costs as the cam shafts bearing supports and the crankshaft bearing supports are all machined at one set up. The rocker arms are lubricated by felt wicks carried in the rocker arm shafts. This method of lubrication is very positive and will lubricate for a week of intermittent running. It also eliminates considerable loss of oil which occurs in overhead cam shaft where oil is fed under pressure.

The oiling system is of the dry sump pressure type, the oil pump being located on the propeller end of the engine, and is driven direct from one of the cam shafts. This pump feeds oil to the center of a distributing pipe located on the inside of the upper crankcase; this gives a more equal distribution of oil to the seven crankshaft bearings than if it were fed into one end of the distributing pipe. Although the oil is distributed at somewhat lower pressure than in other well known makes of aircraft engines, it is more positive in the lubrication of bearings. The crankshaft main bearings have a groove that extends clear around the bearing. This distributes the oil evenly over the entire surface of main crankshaft bearings. This groove continually registers with the opening in the crankshaft, which gives a very positive lubrication to connecting rod bearings, wrist pins and cylinders, especially at high speed.

The oiling system used in other well known makes of aircraft engines depends entirely on oil entering the openings in the crankshaft at each revolution and at high speed. This is a very uncertain arrangement as the openings only register once every revolution at a very short interval. The cam shafts and timing gears are oiled by spray thrown from the crankshaft. The excess oil falling into the bottom of crankcase is returned to the cooling tank by a scavenger oil pump that is driven from a bevel gear on the end of the crankshaft.

The oil pressure gage is tapped into the center of the distributing pipe. This oiling system facilitates maintaining a steady pressure of oil under varying temperatures and with varying viscosities of oil.

The piston is a casting of aluminum alloy 5½ in. long, 3¼ in. heavy section compression rings and one oil ring being used. The top compression ring is 9/16 in. from the top of the piston and placed well away from the heat of the piston head. The wrist pin is fastened in place by a set screw that screws into the aluminum and passes clear through the wrist pin. This set screw is locked in place by a cotter pin. Spring wire lock rings are also provided at ends of wrist pin to prevent the wrist pin from working out in the event of this set screw working loose. The connection rod is a chrome vanadium steel forging of the I-beam section, two-bolt type.



The new six cylinder Hall engine mounted on a test block.

Three carburetors are provided for the six cylinders. Each carburetor has only to feed two cylinders. The advantage of three carburetors over one or two carburetors is that it permits the use of a very short manifold, which increases the volumetric efficiency, allows a more uniform amount of gas to every cylinder, as the distance from carburetors to every cylinder is the same. This also permits a decided slope in the manifold so that any condensation of gas will readily drain into the cylinders. The equal distribution of gas to cylinders is very noticeable in the uniform sound of the exhaust and the lack of vibration in motor. With the three carburetors and the design of the manifolds, this engine will operate equally as well on commercial gasoline as it does on aviation gasoline. This is a decided advantage in commercial work, as commercial gasoline can be obtained at a much lower cost from any supply station.

Special attention has been given to this important feature of the air pressure to fuel system. Heretofore in the plunger type of pump used the lubrication of piston and cylinder has not been positive and they also have not been of sufficient capacity to maintain a steady pressure on the gas tank at

Continued on page 846

The Williams Monoplane

A Single Place, Open Cockpit, Low Wing Monoplane Powered with a Three Cylinder 30 Hp. Anzani Engine

ANNOUNCEMENT WAS recently made by the Niles Aircraft Corp. of Niles, Mich., of the completion of its first product, a single place, open cockpit, low wing monoplane powered with a three-cylinder 30 hp. Anzani engine. This first model, which has been termed the "Williams monoplane" after James R. Williams, president of the corporation, has a full cantilever wing below the fuselage. It weighs only 440 lb. empty. Conventional construction is followed except that the tail skid, which is a wheel, is built as an integral part of the rudder and is fitted with a brake. Though this first single place model is powered with an Anzani engine it is understood that the design is being altered slightly, changing it to a two place side-by-side model powered with a 40-45 hp. Szekely engine.

According to Mr. Williams, on actual test the plane took off in 50 ft. with a climb very close to 1000 f.p.m. He also states that it landed at about 25 m.p.h. which is perhaps due the ground effect caused by the low position of the wing. It was designed for a landing speed of 30 m.p.h. and is stated to have a top speed of 85 m.p.h. and a cruising radius of 360 mi.

The wing has a span of 26 ft. and a chord of 4 ft. 6 in. giving an area of 108 sq. ft. The overall length of the plane is 18 ft. while it stands only 6½ ft. high with tail skid on the ground. The plane is so designed that it can be assembled in about 15 min. There is no external bracing, the landing gear hinging about the lower longerons with the compression member being vertical and mounted on the wing spar. This

Showing internal wing construction.

gives a very wide tread with the center of gravity far from the wheel so that plane will right itself laterally on the ground. However, it is believed undesirable to have a tread much wider than this for a plane of this size as it increases the tendency to ground loop.

Perhaps one of the most interesting details of the Williams monoplane is the tail skid, which, besides being somewhat

Continued on page 854

Front quarter view of the Williams monoplane powered with a 30 hp. Anzani engine.

Aviation *in* Brazil

Activities Were Confined to the Army and Navy until the Famous Flights Brought About Civilian Interest

By M. C. CREMER
Trade Commissioner, Rio de Janeiro

AVIATION IN Brazil, S. A., has been in the public eye during the past few years as a result of several sensational flights across the Atlantic, and along the coast and Caribbean. Trans-Atlantic aviators have received more of the acclaim and naturally Brazilian and Portuguese aviators have had showered upon them most of the public praise.

The first flight to Brazil that stirred popular imagination was that of Walter Hinton, who, with three companions, flew to Rio de Janeiro from the United States. He was given a big ovation. Later he used an airplane to map parts of the Amazon river valley for the National Geographic Society.

Interest in American planes was also furthered by the Pan-American flight of the United States Army, while the attempted flight of Redfern from New Brunswick, Ga., with the possibility of his being lost in the jungle of the north still holds interest. The successes and failures of those who venture upon the Atlantic and Pacific are fully reported by all newspapers, some of them having special columns daily on the first page in which are included aeronautical news from all parts of the world.

Among recent flights to Brazil from Europe, the most attention was given to that of Riveire de Barros, a native of the State of Sao Paulo who, with three companions, flew to Sao Paulo from Italy. He has become a popular hero with gifts running into thousands of dollars showered upon him and his crew.

In order to stimulate interest in aviation, the Italian Chamber of Commerce is offering a prize of 500,000 lire for a flight from Italy to Sao Paulo. A plane is being built in Italy for this purpose.

American Planes Being Used

Aviation in Brazil has been, until recently, almost exclusively confined to the army and navy. Both arms of the service are taking a greater interest in aviation than ever before. One private transportation company has been in operation for several months, and two more began flying the first of this year, while plans for another are under way.

American planes are being used by the navy and the Sao Paulo state police, and a few individuals have purchased American planes. The army and the new transportation companies will use European planes.

Three groups are interested in the development of air transportation in Brazil, two of them being German and the other French. The east coast of South America lends itself admirably to such transportation by reason of the facility with which the cities of the coast, separated by long distances, can be brought closer to each other, while the proximity of the western part of Africa to that part of South America which projects itself eastward into the Atlantic, makes possible the use of airplanes in linking Europe and South America.

The most important group appears to be the Societe Latecoere of France, operating through the Cie. General d'Enterprizes Aeronautiques. The latter organization has been operating several lines between southern France and the north coast of Africa. Negotiations in Brazil were first carried on through a Brazilian subsidiary called the Cie. Brasileira de Emprehendimentos Aeronautices, and authorization permitting operations was secured from the Government. No favors or subsidies were received from Brazil, but the French Government has granted the company the same subsidy for its South American lines as that given for the lines in South Africa. This amounted to 6,250,0000 francs in 1927, and will amount to 39,000,000 francs in 1928, and succeeding years. Payments are to be made at the rate of six francs per kilometer for land planes and 12 francs per kilometer for seaplanes. (The bill authorizing this subsidy was passed by the French Chamber of Deputies on Dec. 10, 1927.)

Operations in Brazil are to be carried on by the French company instead of its Brazilian subsidiary, and offices have been opened in Rio de Janeiro.

Service Started in January

The service was inaugurated in January 1928, and extends from Toulouse and Marseilles to Buenos Aires. The route followed is: Toulouse and Marseilles, France; Alicante, Spain; Tangier, Morocco; Casa Blanca, Morocco; Agadir, Morocco; Cape Juby, Rio de Curo; Villa Cisnerce, Rio de Curo; Porto Etienne, French West Africa; St. Louis, Senegal; Porto Praia, Cape Verde Islands; Fernando de Noronha Island; Nata, Rio Grande do Norte; Recife, Pernambuco; Maceio, Alagoas; Bahia, Bahia; Caravellas, Bahia; Victoria, Espirito Santo; Rio de Janeiro; Santos, Sao Paulo; Florianopolis, Sta. Catharina; Porto Alegre, Rio Grande do Sul; Pelotas, Rio Grande do Sul; Montevideo, Uruguay; Buenos Aires, Argentina.

It is planned later to extend the service to Chilean cities.

Six seaplanes will be used between St. Louis, Senegal, on the African coast and Porto Praia, in the Cape Verde Islands, while six more will be used between the island of Fernando do Noronha and Natal on the coast of Brazil. Between Fernando do Noronha and Porto Praia six fast steamers will be used which will make the crossing in three days. The company expects to later use powerful seaplanes to make the trip across the Atlantic. Five planes are in Rio de Janeiro and two are in Buenos Aires, while six more are on the way. Thirty machines will be used in South America.

A trip is to be made in each direction once a week and it is expected that the saving in time will cause enough mail to be so routed to warrant the investment. At present, the average time required for a letter to go from Bordeaux to Rio de Janeiro and Buenos Aires is 13 and 18 days respectively, whereas the projected air service will deliver it at Rio in 6½ days and Buenos Aires in 7½ days. When airplanes are

Continued on page 856

Materials *of* Construction

Stress Analysis of Commercial Aircraft, Chapter Number Four

By PROFESSOR ALEXANDER KLEMIN
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And GEORGE F. TITTERTON
Late of the Bureau of Aeronautics, Navy Department

THE CHOICE of the proper materials for the structural parts of a new design is a problem of the first importance. The strength properties of materials as obtained from tension, bending, and compression tests are important in obtaining the required strength for a minimum of weight. Other factors are involved, however, such as the ease of manufacture, availability and reliability of sources of supply, suitability of the material for close design and for employment in sections giving the greatest theoretical strength, and durability under service conditions. The main airplane structural materials that have been found by experience to be satisfactory are wood, steel, and duralumin. The properties of each of these will be dealt with in turn.

In early designs wood was used exclusively for the main structural parts with the exceptions of the wires and fittings. In those days the high strength steel and aluminum alloys were either not known or their source of supply was uncertain. Wood was very easily worked, and so experimental designs in wood could readily be changed during process of construction, there being few planes of any one type built. It was not until real production methods were applied to airplane construction that the working of metal could be brought down to an expense comparable to that of wood.

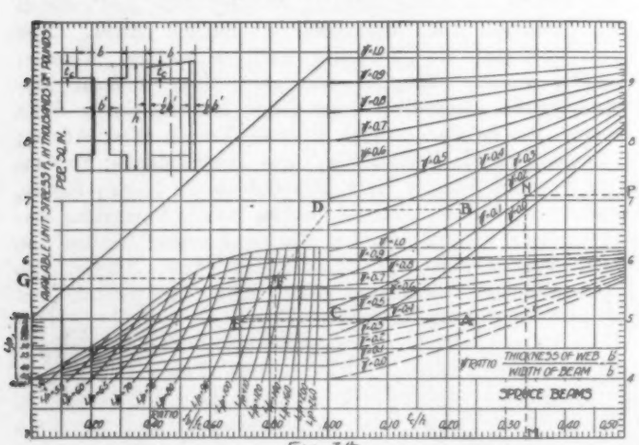


Fig 34

Nowadays the use of wood is confined to wings almost exclusively. It has been displaced by metal elsewhere for the following reasons:

The source of supply is limited and in the case of a large expansion of the industry there would not be a sufficient supply of the highest grade of timber.

The properties of any lot of timber is uncertain. For airplane purposes less than 50 per cent. of the wood may be used.

Variation in the weight of wood may be due to variation of moisture content* or upon the part of the tree from which it comes. For equal moisture contents it is generally true that the heavier a piece of wood the stronger it is. Such variations in weight and strength give rise to uncertainty in design and necessitate higher load factors than are possible with metal.

While wood has a fairly good strength-weight ratio in tension, it may never be used for tension members as it is almost impossible to fasten so as to obtain its maximum strength. Failure by shear or crushing will occur before its ultimate tensile strength can be realized.

The two woods that are used most often in airplane structures are ash and spruce. Ash is heavier and stronger than spruce. It is frequently used for engine bearers where strength and rigidity are a prerequisite. Ash may be steam bent; spruce cannot be steam bent without first being laminated. Spruce is still used considerably for wing, aileron, and stabilizer spars, for ribs, filler blocks, and for streamlining tubular struts. The properties of airplane spruce and ash are listed in Table 1*.

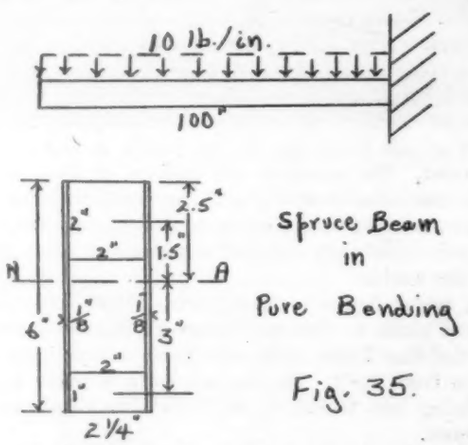


Fig. 35.

TABLE 1 — PROPERTIES OF SPRUCE AND ASH

		Spruce	Ash
Moisture content	per cent	15	15
Modulus of Elasticity	lb. per sq. in.	1,300,000	1,460,000
Allowable Tensile Stress	"	10,000	16,000
Modulus of Rupture (rectangular sections)	"	9,400	14,800
Ultimate Compression, parallel to grain	"	5,000	7,000
Ultimate Compression, perpendicular to grain	"	840	1,920
Longitudinal Shearing Strength	"	750	1,380
Average weight per cubic foot	pounds	27	41
Average specific gravity (based on oven-dry weight)		0.40	0.62
Minimum specific gravity permitted		0.36	0.56

In woods used in airplane construction it is desirable to have a moisture content of about 12 per cent. but as in many

*The moisture content of a batch of wood may be readily determined. A small block of wood is cut from the center of a typical plank of the lot and weighed. The block is then placed in an oven and dried for several hours. It is then taken out and weighed immediately. The loss in weight was evidently due to the moisture evaporating. This loss of weight divided by the oven dry weight and then multiplied by 100 will give the percentage of moisture present in the original block. If this block is taken from a typical plank of any lot the percentage moisture found may be considered as fairly true for the entire lot.

localities wood will absorb more moisture than this, the strength values are based on a content of 15 per cent. The allowable stresses are obtained from tests of three seconds duration only. Airplanes are seldom stressed for periods of time exceeding this so for aeronautic purposes values obtained in this manner are safe. Wood that is stressed for only three seconds will stand a load 17 per cent. greater than wood stressed for five minutes. The variation of the properties of woods is so great that only an average value can be obtained. The values listed in Table 1 are the maximum probable values that a large number of specimens showed. The system of inspection must be relied upon to cast aside those pieces of wood which would in all probability not reach the accepted values.

The value of the modulus of rupture for rectangular sections is given in Table 1. It has been found by experiment that the modulus of rupture obtained with I, or box beams of wood, falls below that obtained with solid rectangular beams of the same material. The ratio of this modulus of rupture to that of solid beams is termed the Form Factor of the section.

A definite mathematical explanation for this reduction in the modulus of rupture of routed and box beams is not available. Qualitative reasoning may be applied however. When the outer fibers have reached their elastic limit they begin to deform rapidly for a further increase in load. The inner fibers are not as severely stressed as the outer fibers, and since they are not as yet at their elastic limit, they assist the outer fibers in resisting deformation. Theoretically the failure of a beam should occur when the outer compression fibers have reached their compression failure stresses. Actually owing to this reinforcement by the inner fibers, the modulus of rupture in bending is much higher than that given by the compression failure stress. In the routed and box sections, the absence of a large number of inner fibers decreases the amount of this support and the more nearly solid the cross-section of a beam is, the greater will be the modulus of rupture or strength in bending of that beam.

The thickness of web and the dimensions of the flanges are thus important in deciding the form factor of any section.

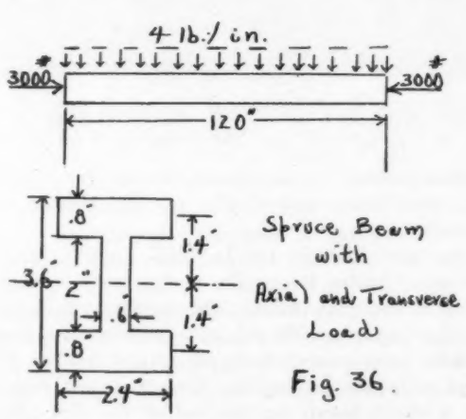


Fig. 36.

To determine the allowable stress in bending of any beam of box or I-section the upper set of curves on the right-hand side of Fig. 34 may be used.

The psi (4) ratio and the thickness ratio of the beam must be determined from the dimensions of the section. It is to be noted that t_c refers to the compression flange of the beam i.e., that flange of the beam which tends to become shorter when load is applied. The use of this set of curves will be illustrated by an actual example.

Example: Assume we have a cantilever beam 100 inches long loaded with 10 lb. per in. and of the section shown in Fig. 35. Find the margin of safety of the beam at the section of greatest stress.

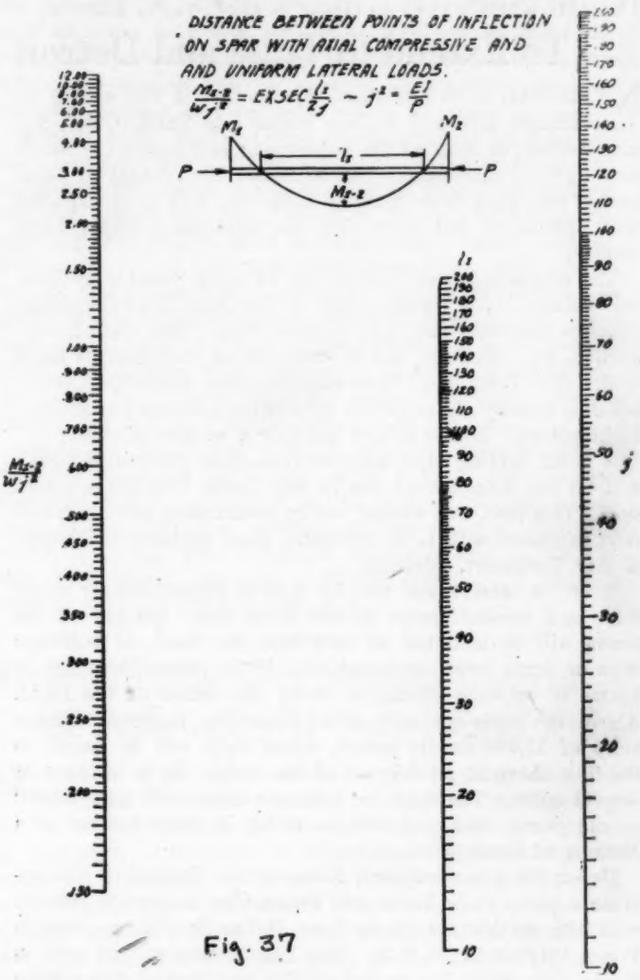


Fig. 37

The properties of the section are:

$t_c/h = 2/6 = .333$ psi $(\psi) - b'/b = 2 \times 1/8/2\frac{1}{4} = .111$

Referring to Fig. 34: Draw the vertical line M-N at the position of t_c/h equal to .333. When this line reaches the position of ψ equal to .111 (between the curves $\psi = .1$ and $\psi = .2$) end it and call this point *N*. From *N* draw the horizontal line N-P. The reading at point *P* is the allowable modulus of rupture for the section, namely 7090 lb. per sq. in. The Form Factor of the section is:

$7090/9400 = .754$

To find the required stress we must employ the bending formula:

$S = My/I$

From Fig. 18 of Chapter 2 the maximum bending moment for a cantilever beam uniformly loaded is $\frac{1}{2}wl^2$ which is $\frac{1}{2} \times 10 \times 100^2 = 50{,}000$ in. lb. From Fig. 35 the value of *y* is 2.5 in. (y is always the distance from the neutral axis [N-A] to the outermost compression fiber).

To find the value of I we must first find the position of the neutral axis. Thus:

$2 \times 2 \times X = 1 \times 2(4.5 - X)$

$X = 1.5$ and $(4.5 - X) = 3$

Then $I = \frac{bd_1^3}{12} + A_1X^2 + \frac{bd_2^3}{12} + A_2(4.5 - X)^2$

$I = \frac{2 \times 2^3}{12} + 2 \times 2(1.5)^2 + \frac{2 \times 1^3}{12} + 2 \times 1(3)^2 =$

28.5 in. ψ

The required stress $S = 50{,}000 \times 2.5/28.5 = 4380$ lb. per sq. in.

Continued on page 848

Night Service Routes of N.A.T. To Extend to Tulsa and Detroit

NATIONAL AIR Transport reports that it will extend its overnight mail and express routes into Tulsa, Okla., and into Detroit, as soon as the government can install the necessary lighting equipment. United States Department of Commerce men have been making a survey, and it is expected that operations will start over the extensions within three months.

The connection with Detroit will be made possible by making Toledo, O., a regular stop on the New York-Cleveland-Chicago overnight mail and express flight. The Detroit connection, and the Tulsa one as well, will be exclusively a night route. The Tulsa line will be extended from Ponca City, Okla., which is already an important stop of the Chicago-Dallas overnight planes. Toledo is now building a modern airport.

A novel lighting plan, adapted from river navigation lights, will be put into use on the 75 mi. Ponca City-Tulsa extension. This plan was worked out by government and air transport engineers with L. D. Seymour, chief engineer of National Air Transport, advising.

A 30 ft. steel tower will be erected approximately every three and one-half miles on the Tulsa line. On top of the tower will be mounted an acetylene gas fixed, or bulls-eye type of drum lamp equipped with 18 in. lenses throwing its beams in opposite directions along the course of the flight. Above the bulls-eye, will be a dome like acetylene blinker lamp of 15,000 candle power, whose light will be visible to the flier above at all degrees of the zenith, for a distance of several miles. The fixed, or bulls-eye lamps will have 50,000 candle power each, and will be visible in clear weather at a distance of about 40 mi.

Under the plans outlined, National Air Transport will operate a plane from Tulsa into Ponca City in time to connect with the northbound plane from Dallas to Chicago, due in Ponca City at 10:50 P.M. The Tulsa plane will be held in Ponca City until the arrival of the southbound plane from Chicago to Dallas due at 4:10 A.M. Then with its load of mail and express from both north and south bound planes, the plane will fly back to Tulsa, thus connecting by air the great oil region, and that whole intensified industrial area, with the rest of the air mail and express routes of the country. The Dallas and Chicago planes, of course, connect with the trans-continental and other mail and express planes at Chicago.

In like manner a plane will leave Detroit at night in time to connect at Toledo with the eastbound overnight mail and express plane out of Chicago and the westbound plane out of New York at 9:35 P.M., returning to Detroit with mail and express from both night planes. The run from Detroit can be made in slightly more than a half hour which will give mailers in that city an airmail closing time later in the evening hours than most other cities enjoy.

Expect Slate's All-Metal Dirigible To be Ready for Testing by July

WITH THE metal envelope now 50 per cent. completed, the all-metal dirigible being developed at the Glendale Airport, Glendale, Calif., by Thomas B. Slate shows every indication of being ready for a trial trip not later than July of this year.

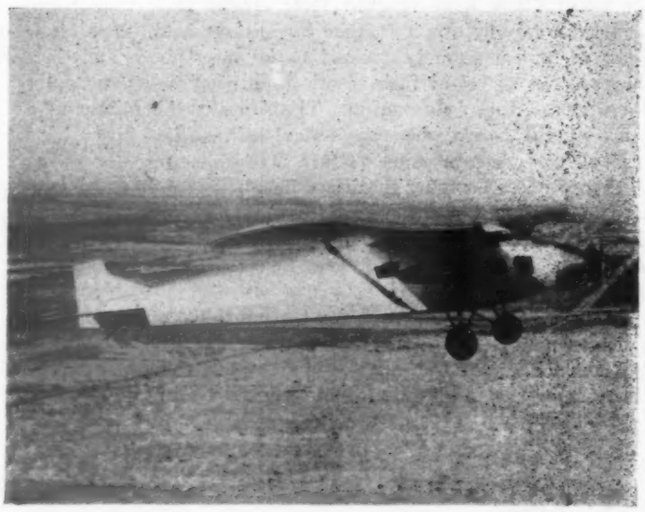
The Slate dirigible is an experimental metalclad type constructed of corrugated duralumin sheets riveted to circular ribs within the bag. There is no internal bracing and no keel or built up framework. This design is said to be more than half again as light as the present types of truss framework, fabric covered dirigibles, yet it is expected to retain equal strength characteristics.

Propelled by a steam turbine driven air blower mounted in the nose of the craft, the Slate dirigible measures approximately 150 ft. in length and 40 ft. in diameter and has a passenger capacity of 40 persons.

At the present rate of construction, work will soon commence on the installation of machinery, accessories, and passenger cabin.

Ryan Engined Albatross Takes Off With 2 1-2 Times Weight Empty

THE ZENITH Albatross three engined monoplane that was described in the June 30, 1927 issue of AVIATION, recently made three attempts to establish a new world's endurance record. On the last of these attempts the plane powered with three Ryan-Siemens 125 hp. engines took off with 1414 gal. of gasoline making the weight of the plane 13,898 lb. loaded. As the plane weighs only 4,000 lb. empty it carried a load of 9898 lb. or almost two and one half times its own weight (2.47 to be exact). On the two previous attempts it took off with 1314 gal. or approximately 600 lb. less. All three attempts were witnessed by Lieutenant Commander Richardson, Lieutenant Tomlinson, and Capt. W. W. Gibson, official N.A.A. observer.



Heavily laden with fuel, the Zenith Albatross flies in an endurance record attempt over the Imperial Valley, Calif.

The flights were made in the Imperial Valley, Calif., with Jack Reed and Charles Rocheville at the controls and Alvin K. Peterson in the main cabin. On the first attempt carrying 1314 gal. of gasoline, 60 gal. of oil, three men, food, water, and radio equipment it took off in about 3,700 ft. with a tail wind of about 10 m.p.h. Unfortunately one of the wheels hit a sharp bump on the bed of the dry lake from which the flights were being made and a seam of the main fuel tank opened forcing them to return after 45 min. The same load was carried on the second attempt when the plane remained in the air 27 hr. 14 min. after which they were forced to land due to the over heating of one of the engines when a warm wind caused them to open the throttle to maintain altitude. A few days later they took off with 1414 gal. of gasoline to stay in the air 9 hr. 45 min. when they were forced down by the failure of a rocker arm. The engines were all in good condition but it was decided to give them a top overhaul before another attempt should be made. It is understood that the next flight will be made over San Diego to take advantage of the cooler ocean air.

Plan Production by January 1929 At New Martin Plant in Baltimore

CONFIRMING THE statement that his company is moving to Baltimore, Md., Mr. Martin now states that The Glenn L. Martin Co. plans to be in operation in that city as early as January 1929. This concern, now located in Cleveland, O., is one of the oldest in the industry, having been in production since 1909.

At an investment totalling $1,500,000, the Martin company will build its first factory unit of 300,000 sq. ft. of floor space at the new 1,000 acre Baltimore Airport now under construction on the Patapsco River at a site 6½ mi. from the heart of the city. Here, at a location surrounded on three sides by water, a mile-and-a-half water take-off can be had in every direction with a very small amount, it is said, of taxiing on the runways—the runways being established on the edge of the landing field. The total cost of development of this project by the city will amount to $4,000,000, $2,400,000 of which is now available.

The Martin factory at this site so suitable for land and seaplane manufacture will be equipped with full modern facilities for production. Permanent equipment and full machine-tool fittings for quantity production are justified, says Mr. Martin, by the favorable trend of the aviation industry.

Glenn L. Martin spent two years in making a study of the trends and markets of aircraft in searching for a locality which, due to natural and developed advantages, might become a United States aircraft center. He finally chose Baltimore, and now plans to gradually move his entire company from Cleveland during the coming two years. The Baltimore plant will, according to plans, employ approximately 800 workers.

Congresssional Medal of Honor Awarded to Lieut. C. F. Schilt

THE HEROISM of Lieut. Christian F. Schilt, U. S. Marine Corps, was recognized recently by the award of the Congressional Medal of Honor. Lieutenant Schilt's feat, one of the most heroic in the history of military aviation, consisted of the evacuation, by plane and under enemy fire, of 18 wounded Marines from Quilali in northwestern Nicaragua after an engagement with Sandino's forces. One of the Marines newest, high-performance airplanes, a Vought "Corsair" was used by Lieutenant Schilt. The plane was one of a number of new "Corsairs" which the Navy Department had rushed to Nicaragua as replacement equipment so that the Marine Aviation Squadrons there would be provided with the latest and best airplanes which the Government has been acquiring under the Federal Five-Year Aircraft Program.

The presentation of the medal will probably be made to Lieutenant Schilt by President Coolidge, after the Marine officer returns from Nicaragua where he is continuing his active service.

The citation read:

For extraordinary heroism in the face of the enemy, distinguished by conspicuous gallantry and intrepedity at the risk of his life above and beyond the call of duty. On the 6th, 7th, and 8th of January, 1928, at Quilali, Nicaragua, during the progress of an insurrection in that country, Lieutenant Schilt, then a member of a Marine expedition, which had suffered severe losses in killed and wounded, volunteered under almost impossible conditions to evacuate the wounded by air and transport a relief commanding officer to assume charge of a very serious situation. Lieutenant Schilt bravely undertook this dangerous and vitally important task and by landing and taking off a total of ten times in the rough, rolling street of the partially burned village, under hostile infantry fire on each occasion, succeeded by almost superhuman skill, combined with personal courage of the highest order, in accomplishing his mission, thereby actually saving three lives and bringing supplies and succor to others in desperate need.

Reports to the Marine Corps headquarters at the time said that Lieutenant Schilt, flying a Vought Corsair airplane, "accomplished the almost impossible task of evacuating eighteen wounded officers and men," three of whom would otherwise have died. The field in which he landed was a hastily constructed one only 70 ft. wide and 300 ft. long with a high bluff at one end and a mountain at the other. Before the mission was started it was expected that should it be successful the plane used would have to be scrapped. However, as Lieutenant Schilt himself said after completion of the mission, "I cannot praise my Corsair plane too highly. It took a terrific beating, but it is now back in commission."

Lieutenant Schilt was born in Richland County, Ill., in 1895 and enlisted in the Marine Corps in 1917. He was commissioned in Marine Aviation in 1921, and in 1926 won second place in the Schneider international cup races at Hampton Roads, Va. The year before he finished second in the Detroit News trophy race held at Mitchel Field, N. Y., in conjunction with the Pulitzer Cup race.

Merced Hills Gets Second Beacon Of Standard Oil Co. of California

DECISION HAS been reached to place the second of the two large incandescent airway beacons of the Standard Oil Co. of California in the Merced Hills, Los Angeles County, just north of the town of Montebello. Installation of the two great 10,000,000 candle power lights, which are designed to revolve six times per minute, is now under way. Mention of these beacons and the pacement of the first on Mount Diablo near San Francisco was made in the March 5 issue of AVIATION.

The beacons will be attended only by two Robots—one the Sauter astronomical time switch which automatically turns the beacon on and off at dawn and dusk, and the Sperry automatic lamp changer which places a spare lamp in operation when the first burns out.

Services of the engineers of the Sperry Gyroscope Co. of Brooklyn, N. Y., were sought by the Standard Oil Co., decision being reached to use the 36 in. revolving beacon using special 1,500 watt, 32 volt Westinghouse lamps. J. F. McConkey, Sperry representative at San Francisco, states that the Mount Diablo beacon, standing at a height 4,000 ft., will be seen by pilots at a distance of 250 mi.

Dakota Airplane Co. Manufacturing Propellers for Low Power Engines

THE DAKOTA Airplane Co., Aberdeen, S. D., recently completed experiments and is now in production on a wood propeller designed by Mr. Fahlin, general manager of the company. The propeller follows conventional engineering practice in its design and is made of high quality birch, having a moisture content varying from five to seven per cent. The company is prepared to fill orders for propellers for Curtiss OX-5 and 150 hp. Hispano-Suiza engines, and is preparing for orders for propellers to be used on any make of engine.

In addition the company is developing a metal adjustable pitch propeller with aluminum alloy blades screwed into a steel hub. The hub design differs from usual practice in the method of retaining the blades. The blades are screwed in place and held at the desired pitch by means of collars.

Curtiss Robertson OX-5 Commercial Monoplane Now Nearing Completion

THE FIRST "Curtiss-Robin" for the Curtiss-Robertson Airplane Manufacturing Co. of St. Louis, Mo., is now nearing completion at the Garden City, N. Y., plant of the Curtiss Aeroplane & Motor Co., Inc. The production models, the first of which is expected to be completed about July 1, will be built at the factory of the Curtiss-Robertson company. The first unit of this plant is under construction at the Lambert-St. Louis Flying Field, St. Louis, Mo.

The "Robin" was designed by Maj. William B. Robertson and the Curtiss engineering staff. The plane is a three place externally braced monoplane powered with a Curtiss OX-5 engine. It has a high wing of wood construction attached to the top of a welded steel tubular fuselage housing a pilot in front with two passengers behind all in a closed cabin. Dual control is provided with the rear installations removable. The cabin will be well upholstered and fitted with an up to date instrument board.

Externally the plane appears to be quite conventional with two supporting struts from the bottom of the fuselage to the wing. The landing gear is mounted to these struts as well as to the fuselage forming what is sometimes termed a "diamond" truss. The engine mount for the OX-5 engine is detachable so that other power plants can be used. The radiator for the water cooled installation is in front of the engine between the V of the cylinders.

Tests in the Curtiss wind tunnel indicate that the plane will have an exceptionally high performance compared with other similar designs. It is expected to sell in the neighborhood of $4000.

Micarta Propellers for OX-5's Now Being Produced by Westinghouse

PRODUCTION HAS been started on what is believed to be the first adjustable pitch propeller designed specifically for the Curtiss OX-5 engine. This new model Micarta propeller manufactured by the Westinghouse Electric & Manufacturing Co. of East Pittsburgh, Pa., has detachable blades with pitch adjustable on the ground. It is stated that this new propeller has been tested at Wright Field, Dayton, O., and shows a speed range from 70 to 150 m.p.h. As the OX-5 Micarta propeller weighs only 42 lb. which, combined with the durability that is claimed for it, has many advantages over some of the other types now in service.

Estimates show that there are approximately 3,500 planes in service in this country powered with OX-5 engines, while it is known that some manufacturers have a considerable stock on hand. Micarta propellers are also made for practically all of the standard engines up to 225 hp. They consist of a specially woven cotton fabric impregnated in phenolic resin pressed under heat and pressure in a polished bronze mold to the general shape of the blades after which they are cut, machined and balanced. The propellers are finished only by removing the burs and "fins" incidental to moulding. It is claimed that they are unaffected by heat or moisture.

Full Time Production in New Plant Begun by American Eagle Company

THE AMERICAN Eagle Aircraft Corp.'s new factory in Kansas City, Mo., has been placed on a full time basis, according to an announcement by E. E. Porterfield, Jr., president and general manager. The company, according to Mr. Porterfield, has received orders that will keep the factory running at full capacity for six months. The company claims to have climbed from the 17th place up among the first division companies in point of plane constructing within the last year. Seven new dealers have been signed up by the company in the last few days. One new dealer in a small Michigan city has placed an order for five planes.

Low Wing Monoplane Built in Soviet Russia Weighing Only 295 lb. Empty

SOME INFORMATION was recently received on a light, low wing monoplane recently completed in Soviet Russia. The C-4 Bourevestnik is single seater, wood construction, open design powered with a 20 hp. Blackburn engine. It is claimed to have a speed range from 38 to 78 m.p.h. with a climb of 546 f.p.m. and a ceiling of 13,000 ft.

Only meager details on the structure are now available. The wing is internally braced with a cantilever landing gear attached at the lower longerons. The plane has a span of 29 ft. 6 in.; length overall of 19 ft.; height 5 ft. 7 in.; wing area 103.3 sq. ft.; weight empty 295 lb.; useful load 220 lb., and a total weight of 515 lb.

Hall-Scott Engines Being Rebuilt As Air Cooled by Dayton Company

THE DAYTON Airplane Engine Co. of Dayton, O., has completed preliminary tests on the "Dayton Cub", a four cylinder in line air cooled engine converted from the Hall-Scott A-7-a water cooled engine. The new power plant will develop 125 hp. at 1550 r.p.m. It will be recalled that the water cooled Hall-Scott engine developed 110 hp. at 1400 r.p.m.

As an air cooled engine the Dayton Cub will resemble the English Cirrus engine which has a similar cylinder disposition though it is somewhat smaller. Plans are being completed for a 50 hr. test.

Heywood Injection Starter is Now Standard Equipment on Buhl Planes

HEYWOOD INJECTION starters of improved design manufactured by the Detroit Air Appliance Corp., Detroit, Mich., are now standard equipment on all planes built by the Buhl Aircraft Corp. of Marysville, Mich. These starters are also being installed on Stinson and Mahoney planes. The starter, which weighs only 27 lb., consists of a small air tank attached to a distributor timed to the engine. Compressed air enters the cylinders on the power stroke turning the engine over at from 300 to 500 r.p.m. until the engine starts. These starters have been used on engines up to 800 hp.

Aero Corp. of California Changes Rates on Three Passenger Routes

NEW RATES for trips from Los Angeles to Phoenix, Ariz., and Tucson, Ariz., and from Phoenix to Tucson have been announced by the Aero Corp. of California at Los Angeles. This company operates a passenger service over these routes using Fokker cabin planes. The new charges are as folllows:

Los Angeles to Phoenix	$30.00
Round Trip	54.00
Los Angeles to Tucson	40.00
Round Trip	72.00
Phoenix to Tucson	10.00
Round Trip	18.00

Congressional Medal is Bestowed On Lindbergh in Washington, D. C.

HIGHEST of United States decorations, the Congressional Medal of Honor, was presented to Col. Charles A. Lindbergh by President Coolidge at Washington, D. C., on Mar. 21 in the presence of members of the Cabinet, Senate, House, and Army and Navy officials. The medal was bestowed on the flier under the terms of the law granting him the honor voted by Act of Congress Dec. 14, 1927.

At the offices of the Secretary of War a few minutes before the ceremony, Mr. Davis presented Colonel Lindbergh

Having fixed the Congressional Medal of Honor around Colonel Lindbergh's neck, President Coolidge congratulates the flier. Vice President Dawes stands at the Colonel's left.

with the Livre d'Or, or book of gold, and with a special medal from the Ligue Aeronautique of France. The Livre d'Or, a handsomely bound volume, records Lindbergh's trans-Atlantic flight and contains an address from the Ligue as well as many famed signatures.

The day of the presentation was a busy one for the Colonel. He also appeared before a House committee and before a Senate committee, urging a separate promotion list for Army Air Corps men calling for a higher pay scale for the airmen.

Production on New Biplane Begun By Victory Company in California

HAVING COMPLETED the installation of all machinery in the new factory at Lankershim Blvd. and Strathern St., North Hollywood, Calif., the Victory Aircraft factory is now in production on the first model of the new three place Victory biplane. Following completion of this plane, a unit of four planes will be built and from then on the present plant will be operated at its capacity of one plane a week.

The present factory is 40 by 60 ft. in size and contains a very complete equipment of machinery necessary for the quantity production of aircraft. The factory is located on a 20 acre field suitable for fly-away delivery and for testing purposes.

The plane under construction is a three place open cockpit biplane powered with an OX-5 engine.

The Victory Aircraft Corp. is capitalized for $50,000 under the laws of the state of California; it is a closed corporation and is amply financed by prominent citizens of North Hollywood.

The officers of the company are F. W. Hicks, president; James Gautier, vice president; Stanley Collins, treasurer; R. R. Benton, secretary; William Shaffer, general manager; and Edward Shields, designing engineer. The directors are Fred Hardt, K. J. Wheeler, P. Bartmus, R. E. Dunman, Jack Gosnell, George McCarthy, J. B. Maguhmer, and Dr. C. J. Simons.

B. F. Mahoney Company Will Retain San Diego Plant for Year or More

THE B. F. Mahoney Aircraft Corp. has now decided to retain its San Diego plant at least one more year and not move all its activities to St. Louis immediately, as announced recently. It is planned, rather, to increase the company's working force and plane production at San Diego, J. C. Nulson, vice president and general manager, has announced.

Nulson stated that the San Diego factory would be retained "indefinitely or as long as business justifies its retention". It is planned to increase mass production to 18 planes a month instead of nine as under the present schedule. Approximately 100 skilled employees are now working at the San Diego plant, double the number employed six months ago.

The first unit of the company's $300,000 plant in St. Louis probably will be ready within five or six months, say officials. The Missouri factory will take care of the Mississippi Valley and eastern markets and will permit a practical interchange of planes when necessary, between the San Diego and St. Louis branches.

Kansan Offers a Prize of $1,000 For Best Airway Marking Scheme

A PRIZE of $1,000 for the best suggestion for the marking of airways is offered by Woody Hockaday of Wichita, Kan., who is well known for marking, as an advertising venture, more than 200,000 mi. of highways in Kansas and Oklahoma before the governments of the two states undertook to direct travelers along their roads.

Hockaday and several other Wichita men recently were granted a charter by the State of Kansas for the American Airways Mapping Association of Wichita. The incorporation was without capital and not for profit.

A national meeting of aviators is to take place at Wichita for the purpose of discussing Hockaday's plans for mapping and marking the air highways of the nation. If the aviators accept his plan, his $1,000 prize will go to the man submitting the suggestion judged second best to his own.

Advance List Price of Waco 10 With OX-5 Power Plant to $2885

WACO 10's powered with the OX-5 engines have been increased in list price from $2385 to $2885, it has been announced by C. F. Van Sicklen, sales manager of the Advance Aircraft Co., Troy, O., manufacturer of the plane. Price less the engine, however, remains at $2035 F.O.B. Troy.

This advance in price of the OX engined plane follows the general scarcity of this popular power plant. Increases have also been announced during the past month or so in the price of the American Eagle and Alexander Eaglerock airplanes, both powered with the OX engine. The former now sells at $2815; the latter at $2750.

Last Minute Briefs

A 52 day 3000 mi. air cruise of Europe is to be conducted by a number of air service companies in joint cooperation, according to a report from the New York offices of the North German Lloyd Steamship Line. That company's liner *Columbus* will leave New York Sept. 8 to reach Bremerhaven, Germany, for the start of the cruise.

The newly formed North American Airways Co., of which Karl M. Haugen is president and general manager, will shortly begin operation of a 100 acre airport built to jointly serve Appleton, Neenah, and Menasha, Wis. A Stinson-Detroiter will shortly be delivered.

Commercial aviation has been entered by the Elk River Aircraft Co., recently formed at Elk River, Minn. L. A. Dare is president and general manager, and Vandy Ludvik is chief pilot. A 40 acre field has been purchased four miles west of the city on Trunk Highway 3.

The McComb Airways Corp. is being formed at Milwaukee, Wis., by Mark W. McComb, Allan McLaren, and William Williams. McComb states that eight passenger cabin planes are to be used in regular service in the vicinity, a Marinette-Chicago line being considered.

The Velie Motors Corp. of Moline, Ill., has completed a five cylinder radial engine which has been test flighted and which is expected to be displayed at the All-American Aircraft Show at Detroit in a Monocoupe.

Ben Johnson of Winona, Minn., has been appointed Travel Air dealer for Southern Minnesota by the Roth-Downs Airways, Inc., of St. Paul. A field has been leased and construction started on a hangar at Winona.

The Loening Aeronautical Engineering Corp., New York City, is completing its first cabin amphibian, a biplane powered with a Pratt & Whitney Wasp engine. It is designed for four to six passengers in addition to the pilot.

The first Fokker F 10 was recently flown at Teterboro, N. J. It is a three Wasp engined monoplane built by the Atlantic Aircraft Corp. to carry 12 to 15 passengers in addition to two pilots.

The Brown Mercury Aircraft Corp. of Los Angeles, Calif., is completing a four place open cockpit monoplane powered with a Menasco Salmson engine.

J. H. Eastman of Detroit, Mich., has completed a biplane flying boat that is to be on exhibition at the All-American Aircraft Show.

The Stinson Aircraft Corp., Northville, Mich., has completed a monoplane to be known as the Stinson Junior. It is powered with a Warner 125 hp. engine.

The Meriden Aircraft Corp., with C. J. Danaher as president, has been formed at Meriden, Conn. A Challenger plane has been purchased.

Newly formed at Hammond, Ind., the Betz Air Lines, Inc., is operating a 25 mi. sightseeing tour over the Chicago-Calumet district.

Capt. George Wilkins is now at Point Barrow, Alaska, preparing to take off in his Lockheed Vega for a flight across the Pole to Spitzbergen.

The Royal Oak Flying Club has been formed at Royal Oak, Mich., and a Waco plane has been purchased by the members for training and pleasure flying.

A production schedule of three planes a week is being inaugurated by the Lockheed Aircraft Co. of Los Angeles at its Burbank, Calif., factory.

A group of 24 men representing 11 aeronautical concerns met recently in St. Paul and formed the Aircraft Association of Minnesota.

The Northrup Airplane Co. of Minneapolis, American Eagle distributor, has been appointed distributor of the Ryan Brougham.

Palmco Air Service was recently formed at Middleton, O. S. J. McAdow, Tom D. Palmer, Orrin Farmsworth, William Kincaid, and Tim Palmer are the organizers.

Bids will be received by the U. S. Post Office Department, Washington, D. C., until May 21 on three alternate air mail routes between New Orleans and the Mexican Border.

William H. Bowlus, formerly of the B. F. Mahoney Aircraft Corp., has been appointed service manager of the Ryan Aeronautical Corp. of San Diego, Calif.

Huff Daland Dusters, Inc., of Monroe, La., announces its acceptance of the Travel Air distributorship for Louisiana. Travel Airs will be used to train students in dusting.

A new plane known as the "Flagship" was recently tested by Cloud Flagg of the Flagship Aircraft Co., newly formed in Keokuk, Ia.

The 125 hp. radial engine built by the Warner Aircraft Corp., Detroit, Mich., has been passed by the Department of Commerce for use in licensed aircraft.

Paramount Aircraft Corp., Saginaw, Mich., is completing a four passenger cabin biplane to be powered with the seven cylinder Warner engine.

Travel Air Manufacturing Co., Wichita, Kan., is exhibiting a closed cabin biplane at the Detroit Aircraft Show.

The Norwood Aero Club was recently formed at that city in Massachusetts.

To Hold 11th. Salon Aeronautique Exhibit in Paris June 29-July 15

AERONAUTICAL PROGRESS will be a leading note in the 11th Salon Aeronautique, or aviation exhibition, which is to be held at le Grand Palais, Avenue des Champs Elysees, Paris, June 29 to July 15. The Salon exhibition, held every two years of late, was inaugurated in 1909.

Numerous foreign manufacturers have always had displays at the Salon, and aeronautical "missions" from all over Europe, South America, and elsewhere, composed of officers, engineers, and technicians invariably attend. Foreign exhibitors will be permitted to bring their display material into France "in bond," thus there will be no custom duties to be paid providing the products brought are re-exported at the close of exposition. Exhibitors will also obtain reduced railway and steamship fares.

The Salon Aeronautique, being held in the summer time, will offer an opportunity for American manufacturers to reach new markets. Additional information may be obtained by applying to the Aeronautical Chamber of Commerce of America, 300 Madison Ave., New York City.

New Operating Company at Boston Airport is Headed by E. T. O'Toole

EDWARD T. O'TOOLE, one of the three founders of the Boston Airport Corp. and Boston's first post-war commercial airplane operator, has formed a new operating company and opened offices at Boston Airport to do a general instruction, aerial taxi, and aerial service business. The new firm is named the Boston Aircraft Flying Service. The 10 hr. flying course is offered at $250. A sliding scale of rates for students has been established with decreasing rentals for plane hire until after 30 hr. flying the student can hire a plane for $15 per hour. Landings are charged for over four per hour thus providing a sort of automatic insurance to the operator.

O'Toole, who recently resigned from the presidency of the Boston Airport Corp., started work on a new airplane early in winter in his factory at 61 Bennington St., East Boston. The plane has a triangular welded steel fuselage and is within a few weeks of completion. Work on this plane has been suspended, however, because of business incident to the new flying company.

Airplane Fleet in Tour of Kansas As State Observes Aviation Week

THE WEEK of April 2 has been set aside as "Aviation Week" by proclamation of Governor Paulen of Kansas, when the All-Kansas Air Tour will cover the state in the interests of general aviation. This tour was originated and sponsored by the Wichita Chapter of the National Aeronautic Association. Marcellus Murdock, president of the Wichita chapter, Roscoe Vaughan, treasurer (and flight commander of the tour), Wilbur Neely, second vice president, and Arch E. Merriam, N.A.A. governor for the State of Kansas, are among those who will make this tour. In deciding upon the itinerary, officials of the Wichita Chapter of the N.A.A. made two requirements of all cities desiring to be visited; each must have a landing field, and each must organize a chapter of the N.A.A. Twenty-six cities have fulfilled these requirements, and it is estimated that 30 planes will make up the air caravan.

The AIRSEDAN

Safety

Built under Department of Commerce Certificate of Airworthiness **No. 12.** *Approved for* **1000 lbs.** *pay load.*

INSURANCE

Full coverage will be granted for all passengers, because they cannot interfere with the controls.

SPECIFICATIONS

Seating Capacity	pilot and 4 pass.
Weight Empty	2100 lbs.
Wing Area	320 sq. ft.
" Span	42 ft.
High Speed (sea level)	120 M.P.H.
Engine,	Wright Whirlwind

EQUIPMENT

Self Starter, Metal Propeller, Compass, Air Speed Indicator, Navigation Lights, Tachometer, Altimeter, Clock, Fire Extinguisher; Fuel, Oil Pressure and Oil Temperature Gages; Air Corps Throttles, Strainer, and Fuel Valve, Exhaust Manifold with Muffler and Cabin Heater, Metal Mail or Baggage Compartment.

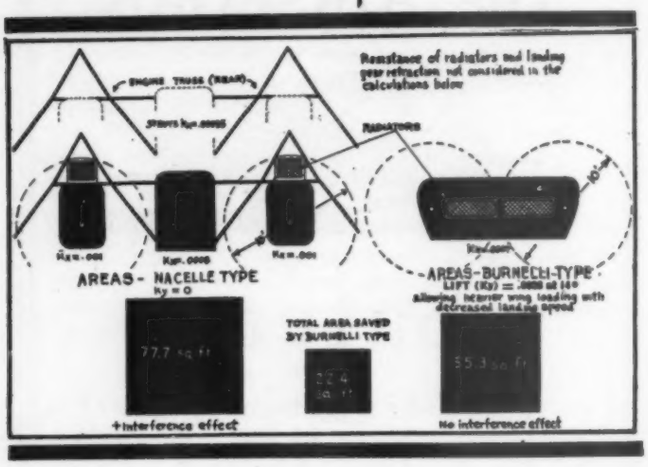
The Ideal Commercial Plane

Price $12,500 Flyaway
Completely equipped

BUHL AIRCRAFT CO.

Marysville, Michigan

CONTROL


Resistance of radiators and landing gear retraction not considered in the calculations below
ENGINE TRUSS (REAR)
STRUTS
RADIATORS
AREAS - NACELLE TYPE
Ky = 0
AREAS - BURNELLI-TYPE
LIFT (Ky) = .0008 at 140
Allowing heavier wing loading with decreased landing speed
TOTAL AREA SAVED BY BURNELLI TYPE
77.7 sq ft
55.3 sq ft
+interference effect
No interference effect

THE following test pilots have contributed to the demonstration of satisfactory control and advancement in design of the Burnelli airfoil fuselage multiple engined type through the operation of the giant RB1 and 2. Bert Acosta, Clarence Coombs, Randolph Page, Lloyd Bertaud, Edward Stinson, Howard Rinehart, George Pond, Romer Weyant, Homer Berry and Earl White.

Some Advantages of the

BURNELLI TYPE

Accessible multiple engine compartment
Extensive reduction of head resistance
Reduced turning moment on one engine
Fuselage lift reduces landing speed
Increased capacity of the fuselage
Structural efficiency and simplicity
Practical Landing Gear Retraction

REMINGTON AIRCRAFT CORP. BURNELLI

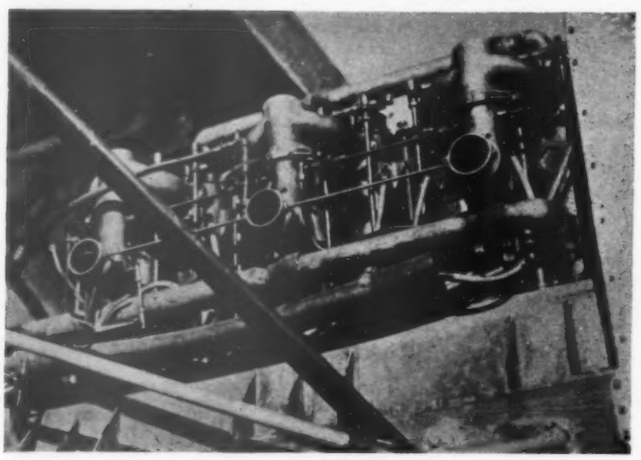
247 PARK AVENUE, NEW YORK CITY

The Hall Engine

Continued from page 835

all times, especially if a slight leak occurs in air line, generally caused by vibration. Although a hand pump is provided for an emergency, the pilot seldom discovers the fall in pressure before a back fire through carburetor takes place, which very often causes a fire that destroys the plane.

The air pressure pump for the fuel system is of the rotary sliding vane type, and is driven direct from one of the cam shafts. Lubrication of all moving parts is self contained. It is equipped with a thick section glass dome which keeps the oil level in view at all times, the dome containing enough oil for two weeks of intermittent running. This pump is very



The induction side of the Hall engine showing the three carburetors.

simple as it has only four moving parts, the rotor and three vanes. The oil flows from the dome to the rotor and is returned by the discharge of air back to the dome. This pump has been thoroughly tried out. It was run on a bench test for 100 hr. continually at a very heavy overload of 100 lb. pressure. It has also had 400 hr. of service on motor.

Ignition is furnished by two Dixie magnetos and two spark plugs per cylinder. The magnetos are mounted on a bracket cast integral with gear case cover at rear end of engine, and are driven direct from cam shaft gears. They are extremely accessible and can be removed by removing four bolts from each. This engine can be equipped with generator and battery ignition system if found desirable in order to furnish a source of current for instrument board lights, etc. Provision can be made for an electric starter mounted on the lower half of crankcase on the propeller end of the engine.

A self aligning thrust bearing is provided in a separate steel housing bolted to the front end of the upper and lower half of crankcase. This arrangement allows for the inspection or replacement of those parts without first having to remove the crankshaft and oil pan, which is generally the case in other aircraft engines. A double bearing is provided so that the engine may be used in either a pusher or tractor machine without change. The upper crankcase is an aluminum alloy casting. The explosion force is carried through the hold down bolts that extend from the top of the cylinders through the crankcase to the main crankshaft bearing caps. With this arrangement the crankcase has very little explosion stress to support.

The crankshaft is a chrome vanadium steel forging and follows typical six cylinder practice.

The crankshaft and connection rods are fitted with bronze back babbit lined with shims. This arrangement permits the rapid adjustment and the renewal of these parts without

any special equipment. This saves the expense of new bearings as heretofore bearings could not be adjusted. They had to be renewed.

In making these adjustments it is only necessary to remove the oil pan and the two nuts on main bearing caps and the two nuts on connecting rod bolts, then remove the caps and enough shims to take up whatever play there may be in bearing.

The manufacturer's specifications are as follows:

TYPE: Vertical in line, water cooled.

Number of cylinders	6
Bore	5 in.
Stroke	7.50 in.
Displacement	884 cu. in.
Hp. at sea level	300 at 1800 r.p.m.
Weight per b.hp.	2.33
Oil consumption	.008 lb. per hp. hr.
Fuel consumption	.43 lb. per hp. hr.
Weight dry	700 lb.
Compression ratio	6.25 to 1

Parks Air Line Acquires 100 Acre Flying Field Lying Near St. Louis

A NEW flying field within 20 min. drive from downtown St. Louis has been acquired by the Parks Air Line, one of the flying companies now operating at Lambert-St. Louis Field. It is a 100 acre tract three miles south of the Free Bridge on the Illinois side of the Mississippi.

The new field, topographically, is ideal for an airport and is one of the sites surveyed last summer when St. Louis was casting about for a location for a municipal field. It is flat, smooth, and well drained and is protected by the levee from high water. An electric car line, a hard road, and railroad facilities are within immediate reach and the field is less than six miles from Twelfth and Olive streets.

The Parks company took over the tract on a five year lease at a total rental of $20,000. Operations will begin within a few weeks at the field where the Parks Air Line plans to pursue its flying school, for which an enrollment of more than 100 students is planned. The company has retained Derek White, formerly with a school at Marshall, Mo., said to be the largest civilian instruction center in the country from the standpoint of enrollment. White hopes to have enrolled 1000 students by the close of this year.

The Parks Air Line will maintain its quarters at Lambert-St. Louis Field for the present at least. Clyde Brayton, chief pilot of the company, will be in charge there. He and O. L. Parks, vice president of the concern, are former members of the Marine Corps.

City Manager of Cincinnati Plans Increase in Lunken Field Budget

THAT C. O. SHERRILL, Cincinnati, O., city manager, plans a considerable increase in the $200,000 budget for 1928 allotted for the development of Lunken Airport, Cincinnati's newly-acquired municipal field, was revealed following a recent meeting of the city council.

Sherrill said that he did not think it would be possible this year to spend for a soldiers' memorial $100,000 that had been allotted for that purpose in the program, and that this money, together with from $50,000 to $80,000 could be transferred from other enterprises to the air field project.

A total bond issue for airport development carried at the November election was for $500,000, only a part of which was expected to be available the first year.

428658

Truscon Hangar for the Fairchild Airplane Manufacturing Corp., Farmingdale, L. I.

AIRPLANE HANGARS

Truscon Airplane Hangars are permanent and fireproof. They are assembled from standardized units which can be combined into buildings of any desired length and width. Being laid out in clear spans, their unobstructed floor space assures utmost freedom in handling ships.

Large Sliding Doors

opening the full width of the building, simplify the storing of planes. We furnish Steel Doors for any requirements.

TRUSCON STEEL COMPANY
YOUNGSTOWN, OHIO
ESTABLISHED 1903
Manufacturers and Engineers
WAREHOUSES AND OFFICES IN PRINCIPAL CITIES

TRUSCON BUILDINGS

for all airport requirements and for every need of the Airplane Industry.

Detail information and quotations on request.

Truscon Steel Company
Youngstown, Ohio

Please quote price on Hangar as follows_____
Length Width Height

☐ Please send Descriptive Folder.

Name_____

Address_____

Materials of Construction

Continued from page 839

Margin of Safety is 7090/4380 — 1 = .61

It is to be noted in the example just given that b′ is the total thickness of the web on both sides in box beams. Also that in computing the moment of inertia of the section the web was neglected entirely. Omitting the web from this calculation involves errors on the safe side and is advisable. However if it is desired to include the web only that portion of it whose grain is parallel to the beam axis and ½ of that with its grain at 45 degrees to the axis may be considered in the calculations.

There is a further reduction in the allowable stress on a wooden member subjected to combined bending and axial compression loads. Fig. 34 is also adapted to the calculation of this value. The lower set of curves on the right-hand side of the figure represent the elastic limit in pure bending for various values of t_e/h and psi (ϕ) ratios. The upper curves on the right-hand side which we just used in the preceding example represent the ultimate strength in bending.

From a series of tests run at the Forest Products Laboratory at Madison, Wisconsin, the curves on the left-hand side of the figure have been calculated and plotted for combined bending and compression loads on box and I-beams. The basis for these curves may be obtained from a consideration of the formula for combined bending and compression given in Chapter 2 of this series. That was:

$$F_t = f_b/f_t(F_b - F_c) + F_c$$

where F_t = allowable combined unit stress

$f_b = My/I$ = bending stress

$f_t = f_b + f_c = My/I + P/A$ = total applied stress

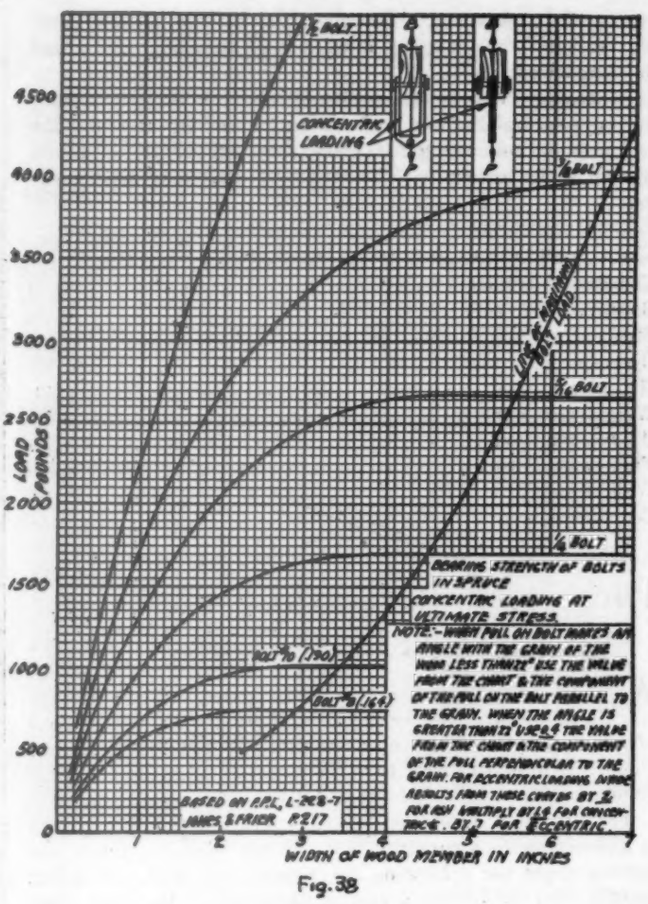


Fig. 38

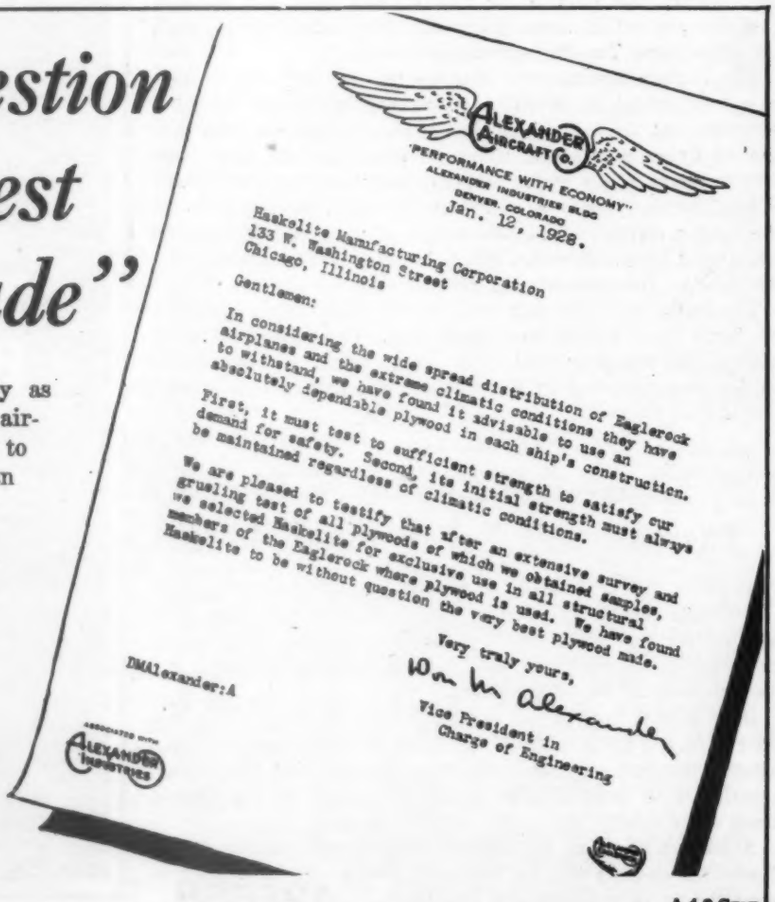
"Without question the very best plywood made"

ONLY PRODUCTS which can classify as "the very best" ought to enter into airplane construction. No builder can afford to gamble with inferior materials for human lives are at stake.

The accompanying letter from the Alexander Aircraft Company indicates the care leading builders take in selecting suitable material. Such builders use HASKELITE.

HASKELITE MANUFACTURING CORP.
133 West Washington Street, Chicago, Ill.

HASKELITE



ALEXANDER AIRCRAFT CO.
"PERFORMANCE WITH ECONOMY"
ALEXANDER INDUSTRIES BLDG.
DENVER, COLORADO

Jan. 12, 1928.

Haskelite Manufacturing Corporation
133 W. Washington Street
Chicago, Illinois

Gentlemen:

In considering the wide spread distribution of Eaglerock airplanes and the extreme climatic conditions they have to withstand, we have found it advisable to use an absolutely dependable plywood in each ship's construction.

First, it must test to sufficient strength to satisfy our demand for safety. Second, its initial strength must always be maintained regardless of climatic conditions.

We are pleased to testify that after an extensive survey and grueling test of all plywoods of which we obtained samples, we selected Haskelite for exclusive use in all structural members of the Eaglerock where plywood is used. We have found Haskelite to be without question the very best plywood made.

Very truly yours,

DMAlexander:A

Vice President in Charge of Engineering

A 4-2-Gray

F_b = allowable bending stress — modulus of rupture

F_c = allowable compressive stress — yield point

Let us analyze the curves of Fig. 34. For any given section of beam we can readily obtain a value of F_b = the allowable modulus of rupture. Point *D* in the figure is such a value. f_b and f_t can be calculated from the conditions of our problem and the ratio f_b/f_t obtained. This will locate the vertical line culminating in the point *F* in the figure. Now however to obtain the allowable value of F_c, the allowable yield point of the material, is more difficult. When the stress is pure compression, that is, the ratio f_b/f_t is zero this value of F_c is 4000. As the bending stress f_b becomes larger and larger relative to the total stress f_t the allowable yield point likewise becomes greater, i.e., the curves in Fig. 34 slope upward to the right starting at 4000. When the stress is pure bending ($f_b/f_t = 1$) this set of curves have their maximum values which are the elastic limit values of pure bending. The value of F_c then lies somewhere along these curves depending upon the ratio of bending stress to total stress (f_b/f_t). To place it more definitely the L/ρ, or slenderness ratio, of the beam must be known. Here *L* is a measure of length and $\rho = \sqrt{I/A}$ which is known as the radius of gyration of this section. As we found in Chapter 2 in the discussion on columns the greater the slenderness ratio the less was the direct compressive stress and the more the bending stress. Thus in Fig. 34 the higher the value of L/ρ the greater is the allowable value of F_c, the elastic limit of the material. Point *E* in Fig. 34 is a point located by the use of the L/ρ and elastic limit values of a beam. *E* then is the F_c value in the formula and *D* is the F_b value. Our allowable total stress F_t then lies somewhere between the two. This point *F* in the figure is located by drawing a vertical line at the correct f_b/f_t ratio and taking the point where it crosses the line joining E-D.

To illustrate more definitely the use of the diagram let us compute the allowable stress in an actual case, i.e., the case which is represented by the letters A-B-C-D-E-F-G and the dotted lines. This case is the beam shown in Fig. 36 which is freely supported at points 120 in. apart and subjected to a centrally applied axial load of 3000 lb. and a uniformly distributed load of 4.0 lb. per in. It is desired to find the allowable stress and the margin of safety of the beam.

The geometrical properties of the beam are:

$A = 0.8 \times 4.8 + 0.6 \times 2.0 = 5.04$ sq. in.

$I = 8.14$ in^4

$\rho = \sqrt{I/A} =$

$\sqrt{8.14/5.04} = 1.27$ in.

$L/\rho = 120/1.27 = 94.5$

$I/y = 8.14/1.8 = 4.52$

The external loads are:

$P = 3000$ lb.

$M = wj'^2(1 - \text{sec}L/2j)$ **

$j' = EI/P = 1{,}300{,}000 \times 8.14/3000 = 3530$

$J = 59.4$ $\quad L/2j = 120/2 \times 59.4 = 1.01$

sec $L/2j = 1/\cos$ $\quad L/2j = 1/0.532 = 1.88$

Whence $M = -4 \times 3530 \times 0.880 = -12{,}420$ in. lb.

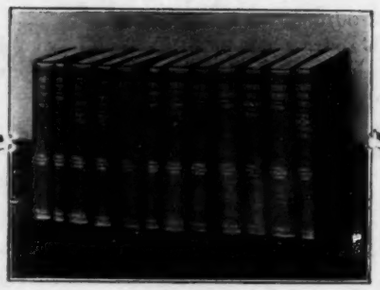
This is the total bending moment including the secondary bending, i.e., that bending due to the end load $P = 3000$ lb. times the deflection of the beam. The importance of computing this secondary bending is apparent when we find that the primary bending moment due to the loading on the beam is only $wl^2/8 = 4 \times 120^2/8 = 7200$ in. lb. This is but 7200/12420 equals 58 per cent. of the true bending moment on the beam.

The computed unit stresses are:

$f_c = P/A = 3000/5.04 = 600$ lb. per sq. in.

$f_b = My/I = 12{,}420/4.52 = 2750$ lb. per sq. in.

$f_t = f_b + f_c = 3350$ lb. per sq. in.



Reliable technical information for designers, flyers, manufacturers, operators, and students in

The Ronald Aeronautic Library

HERE is the first organized, comprehensive source of up-to-date, technically accurate information on practical aeronautics in all its developments.

— Manufacturers and designers find in these books tested information about materials, costs, design, and operation needed for the production of aircraft and aircraft accessories.

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$f_b/f_t = 2750/3350 = 0.82$

The allowable stress may now be found from Fig. 34. The dotted lines indicate how the quantities are found.

The ratio $t_e/h = 0.8/3.6 = 0.222$

$\psi = 0.6/2.4 = 0.25$

Elastic limit in bending (shown by A and C) = 4970 lb. per sq. in.

Modulus of rupture (shown by B and D) = 6830 lb. per sq. in.

Point E representing the elastic limit under combined loading is found by interpolation between the curves for L/ρ and the intersecting curves of elastic limit.

E-D is then drawn and the ordinate of its intersection with the line representing a ratio of f_b to f_t of 0.82 represents the allowable total unit stress. By drawing F-G this value is seen to be 5670 lb. per sq. in.

The margin of safety is 5670/3350 — 1 = .69 or 69 per cent. This does not mean that the loads could be increased 69 per cent. because the secondary bending would increase much faster than the load, but it does indicate that the strength is considerably greater than the load.

In Fig. 34 the steps are illustrated by the dotted lines. The important line is E-D drawn from the intersection of the curves of yield and slenderness ratio to the modulus of rupture value. For slenderness ratios less than 45 this line should be drawn from the left hand border of the figure at the point that corresponds to the proper value of L/ρ up to the modulus of rupture value.

In applying the chart of Fig. 34 to wing beams the *L* in the L/ρ quantity is the distance between inflection points. This distance may be readily obtained for ordinary loadings from Fig. 37 which is taken from the Handbook.

***Foot-note: Methods of computing the secondary moments due to axial load will be explained in detail later as the need arises.*

In the figure M_1 and M_2 are the moments at the points of support 1 and 2 respectively. M_{1-2} is the maximum moment in the span. l_x is the distance between points of zero moment which as we learned in Chapter 2 are also inflection points. The value *j* is the square root of EI/P.

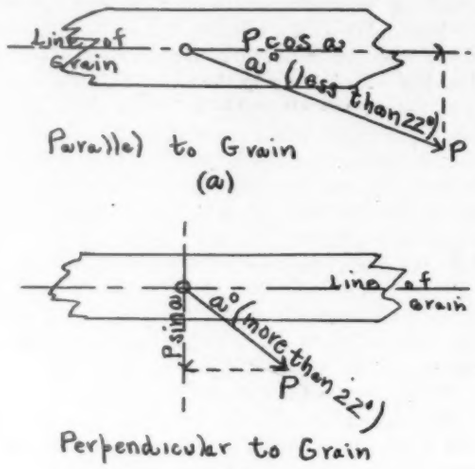

Fig. 39

That is: $j = \sqrt{EI/P}$ and $j^2 = EI/P$

where E is the modulus of elasticity of the material

P is the axial compressive load

I is the moment of inertia of the section

The value of M_{1-2}/wj^2 must also be found. In this expression:

M_{1-2} is the maximum moment in the span

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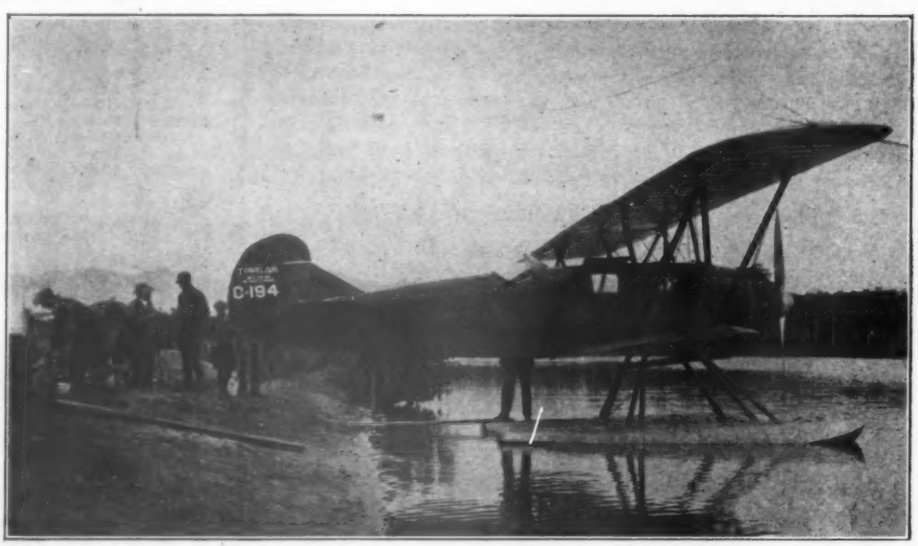

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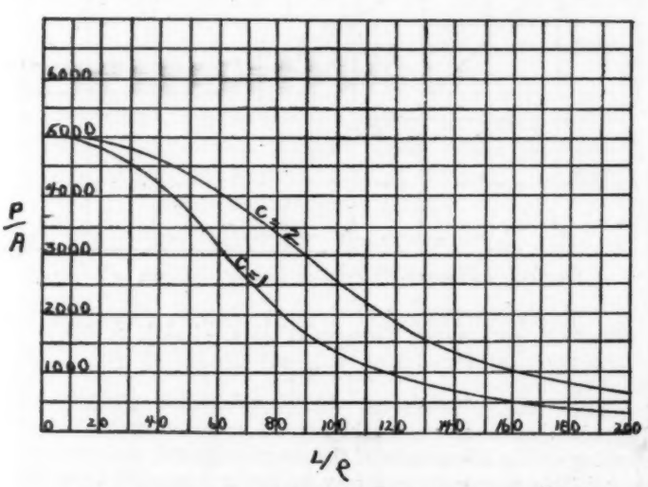
w is the loading per in. run on the beam
j^2 is equal to EI/P as shown above.

After the values of j and $M_1 - {}_1/wj^2$ are found we place a ruler from one value to the other in Fig. 37 and read the value of 1_x that is cut in the middle column. This is the desired length, 1_x, between inflection points. This 1_x is the L in figuring L/ρ.

In present day construction wing struts and wires, aileron hinges, drag wires, etc., require a joint to be made between wood and metal. Usually this takes the form of a sheet fitting bolted to the spar. The sheet steel and the bolts may be plenty strong enough to take the loads but in transmitting the load to the wooden spar they will often cause local crumbling. This is more especially true when the load is applied at an angle to the grain of the wood. The Forest Products Laboratory has done a great deal of testing to determine the allowable loads that airplane woods are capable of carrying. Sections of spars were made up and different diameter bolts fastened through them and pulls exerted on the bolts through all possible angles. The results of their tests were coordinated and the curves shown in Fig. 38 drawn to cover all possible cases.

The thumb nail sketches at the top of the figure illustrate what is meant by concentric loading. An eccentric load is one in which force is applied at an angle to the axis of the bolt other than 90 deg.

The allowable load for different diameter bolts may be read from the ordinate at the left. The width of the wood member in inches, the abscissa, might well be called the length of



Johnson-Euler Column Curves for Spruce

Fig. 41

the bolt in inches that is actually in the wood. The note in the lower right-hand corner explains the method of application when the loads are at an angle to the grain of the wood and when they are eccentric.

When the pull on the bolt makes an angle of less than 22 degrees with the grain of the wood, the component of the pull parallel to the grain is used and the values read directly from the chart in Fig. 38. An illustration of this form of loading is shown in Fig. 39a. The pull P makes an angle a (less than 22 deg.) with the grain of the wood. P cos a is the component of the pull parallel to the grain of the wood. The allowable load as read from the chart must not be less than the value of P cos a.

When the angle a is greater than 22 deg. (Fig. 39b) the component of the pull perpendicular to the grain is employed. This value, P sin a, may not exceed 0.4 of the value read from the chart of Fig. 38. The reason for this great reduction in allowable load is due to the shape of the fibers. Fibers in a direction parallel to the grain are little tubular columns

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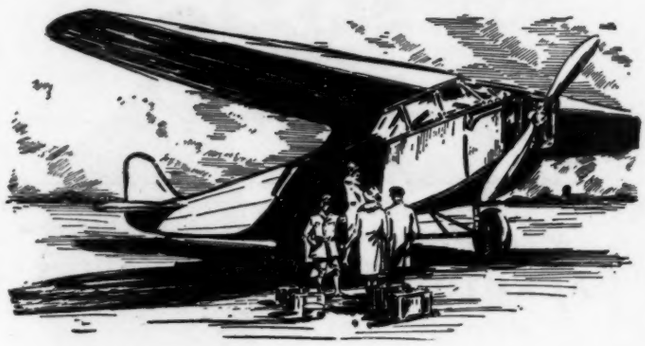

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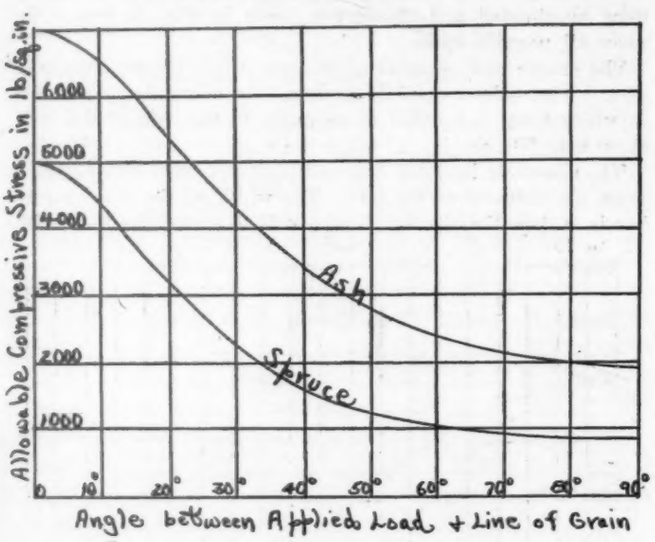
which are quite strong. They mutually support each other and thus increase their apparent strength. In the direction perpendicular to the grain they are merely little cylinders with extremely thin walls which crush easily.

For eccentric loading, i.e., where the line pull makes an angle other than 90 deg. with the axis of the bolt, the values obtained for concentric loading as explained above must be reduced by half. In this type of loading it is especially important that a good sized washer be placed under the head of the bolt to prevent it from pulling through.

As just explained wood can stand compression parallel to the grain much better than across the grain. As the angle of application of a force is moved from along the grain through 90 deg. until it is perpendicular to the grain the resisting power of the wood is gradually diminished. The compressive strength of spruce and ash through this entire range is shown in Fig. 40.

In commercial planes oftentimes a wrapped steel fitting is used on wooden spars to take the loads of wing struts and wires. It is important that the sheet portion of this fitting



Allowable Compressive Strength of Wood - Load at Angle

Fig. 40

be made just as strong as the lug. A sufficient area of sheet bearing on the upper side of the spar is also extremely important. This necessary area may be easily computed from the curves of Fig. 40.

Spruce struts are still used to some extent especially for compression members in the drag truss. They are seldom used in exposed locations as their resistance for a given strength is far greater than that of a metal strut. The allowable column load that spruce struts will stand may be read from Fig. 41.

The curve labelled C — 2 may be used when the ends of the strut are built-in or restrained. The curve marked c — 1 is to be used when the strut is pinned at the ends. The column at the left of the chart reads P/A which is the allowable column load per square inch. This value must be multiplied by the cross-sectional area of the column being investigated to determine the allowable column load *P*.

The slenderness ratio of the column must be computed. L is the length and ρ for square or rectangular sections is equal to .288 d where for a rectangle *d* is the shortest side.

Plywood is extensively used for the webs of ribs and box spars. The face plies are usually made of spruce, birch, or mahogany. Softer woods such as balsa, basswood, and poplar are used almost exclusively for the core. Harder woods are preferable for face plies as they resist abrasion better,

give a harder surface for contact with washers and other fittings, and take finish well. On the other hand a soft core reduces weight and expense, gives better glueing surfaces, and reduces the tendency of the panels to warp and buckle.

As shown above the Form Factor of a box beam is dependent upon the web thickness. It has been found from experience inadvisable to use a thickness of less than ⅛ inch for each web. Even this is rather thin except for small airplanes of 1500 lb. or less. For this size plane or smaller it is probably best to use a solid section instead of a box spar. For a monoplane where the span and moments are great it may be found advisable to use a box spar even for these small planes. Too thin a web however will result in increased deflections and secondary stresses in the spar.

The Department of Commerce allows 1800 lb. per sq. in. longitudinal shear for two-ply spruce webs on box spars. The longitudinal or horizontal shear as it is sometimes called must always be figured for the web of a box spar. The stress for any design may be conservatively figured by the following formula:

$$f_{s\ max} = 3 \times S/2 \times A$$

where S is the external vertical shear including the load factor at the section investigated. For spars it is the maximum value of the shear.

A is the total area of the webs at the section. If this value of f_s is less than 1800 lb. per sq. in. the web is strong enough.

As an example let us consider the box beam illustrated in Fig. 35. The maximum shear on the beam is wl which is $10 \times 100 = 1000$ lb.

Total Area of web is: $2(6 \times 1/8) = 1\frac{1}{2}$ sq. in.

Then $f_{s\ max} = 3 \times 1000/2 \times 1\frac{1}{2} = 1000$ lb. per sq. in.

Margin of Safety is $1800/1000 - 1 = .80$

In the construction of box spars it is important that stiffeners or narrow spruce blocks be glued at regular intervals inside the webs and flanges. These relieve the stress somewhat and prevent local buckling of the web.

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To be continued in the next issue.

To Teach Aviation Fundamentals In Rensselaer Polytech Course

AVIATION'S FUNDAMENTAL principles will be taught to seniors and post graduates in a course to be given next semester at Rensselaer Polytechnic Institute, Troy, N. Y., it has been announced. The course will come under the general head of mechanical engineering and will be concerned with the principles of flying, engine construction, and the like. It is expected that more than 100 will take this course of which Prof. Grant K. Palsgrove of the mechanical engineering department will be in charge. In connection with this new move, a group of students have formed the Rensselaer Aeronautical Club of R.P.I.

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GRUSS AERO Struts are now furnished as standard equipment on all Model B-1 Ryan Broughams built by the B. F. Mahoney Aircraft Corp. They are adopted as standard equipment after a set of Aero Struts had been in use on one of the Mahoney passenger and service planes for five months. It was the experience of the B. F. Mahoney Corp. that the Aero Strut assisted greatly in making smooth landings on rough fields and in keeping severe landing shocks from being transmitted to the structural frame of the plane.

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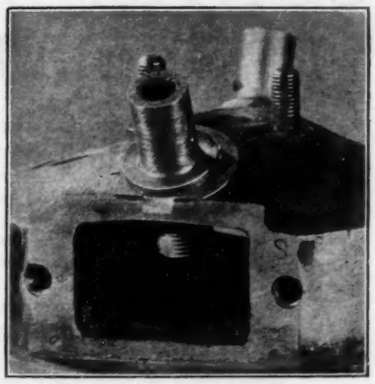

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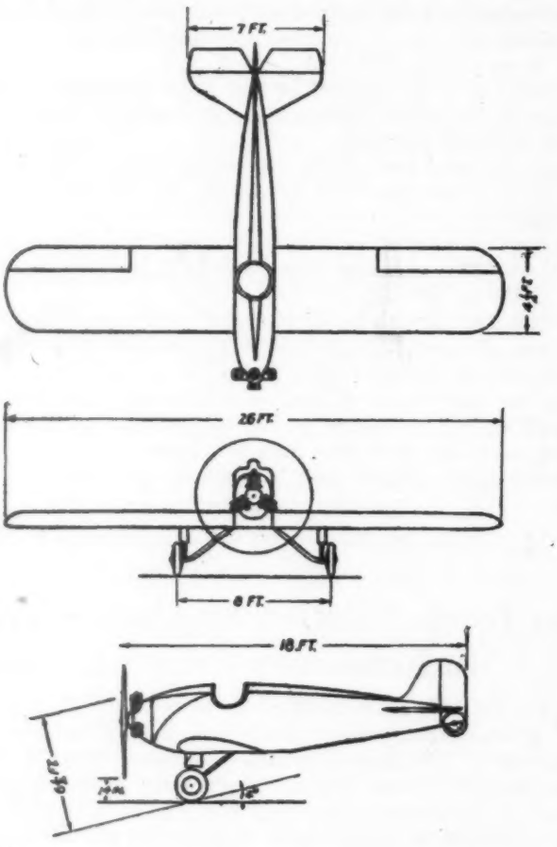
The Williams Monoplane

Continued from page 836

unconventional in being a wheel mounted in the rudder, is fitted with a brake. It is a wire wheel with a brake band mounted at its rim. The rudder is of welded steel tubing with the wheel cowled in with sheet metal. The wheel is therefore steerable with the rudder and in addition is faired in, tending to increase the area of the rudder.

On this first model the cockpit is very wide and roomy being fitted with stick control and rudder pedals. The engine on the nose is fitted with a spinner which fairs in with the lines of the fuselage. Behind the engine and above the pilot's feet is the main fuel tank of 7½ gal. shaped to act as part of the fairing above the rectangular fuselage of welded



Three view drawing of the Williams monoplane.

steel tubing. No wire bracing is used, the entire structure being built up in the form of a Warren truss. Behind the cockpit and on the top of the fuselage is a turtle deck of wood completing the streamline form. In line with the pilot's head is a fairing extending from the front end of the fuselage and merging into the rudder at the rear. It is broken only by the opening for the cockpit, where it acts as part of the bracing for the windshield. Excellent vision is afforded in all directions except directly below the pilot where it is obstructed by the wing.

The wing is of full cantilever construction and according to the manufacturer is very rigid in spite of the lack of any external bracing. The spars are built up of spruce and mahogany plywood in the form of a box spar. The ribs are built up of spruce strips into a Warren truss with birch plywood gussets at the joints. Drag bracing consists of welded

steel tubes for compression struts with piano wire diagonal bracing. The airfoil used is a Gottingen 387.

The manufacturer's specifications on the Williams monoplane with an Anzani 30 hp. engine are as follows:

Length overall	18 ft.
Height	6 ft. 6 in.
Span	26 ft.
Chord	4 ft. 6 in.
Wing area	108 sq. ft.
Airfoil	Gottingen 387
Weight empty	440 lb.
High speed	85 m.p.h.
Landing speed	30 m.p.h.
Range	360 mi.
Climb at ground	925 f.p.m.
Absolute ceiling	19,000 ft.

Application has been made for the Department of Commerce Approved Type Certificate and it is stated by the manufacturer that quantity production will be started when this has been granted. In the meantime the plant is being equipped in preparation for this. The officers of the Niles Aircraft Corp. include James R. Williams, president; Wilber Burns, vice president, and Philip B. Friday, secretary and treasurer. The board of directors include Francis J. Plym, William F. Harrah and Walter H. Parkin.

Detroit Balloon Club Organized By Lighter-Than-Air Enthusiasts

EDWARD J. HILL, winner of last year's Gordon Bennett International Balloon Race, William C. Naylor, chief engineer of the Stinson Aircraft Corp.; and Judge Henry S. Hulbert of Wayne County Probate Court are among those who have organized the Detroit Balloon Club, whose purpose, it was announced, is to promote the use of lighter-than-air craft and sponsor ballooning activities in Detroit, Mich. The organization includes balloonists who hold 14 United States and nine world balloon records.

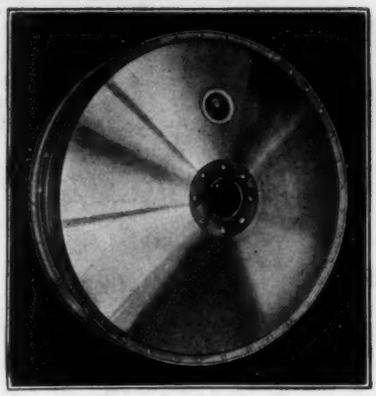
Hill said membership in the club will be open to the public and members will have an opportunity to learn balloon piloting at cost. The club now has two balloons of its own, while individual members own three more. It is planned to use the balloon field at Wyandotte for operations and as a point for a series of flights within the near future.

Judge Hulbert, chairman of the committee on arrangements for the Gordon Bennett races in Detroit last year and an active amateur balloonist, is president of the new club. Hill is secretary and Naylor is treasurer. Naylor has served both as pilot and aide in the lighter-than-air craft for several years, while Hill is connected with the Aircraft Development Corp. of Detroit.

School at Aberdeen, S. D., Offers Full Flying and Mechanics Course

A FULL course in airplane mechanics and flying is now being offered by the State Auto, Electrical, and Aviation School at Aberdeen, S. D. Olaf Fahlin, who has had nine years of aeronautical experience with some 2500 hr. in the air, is chief pilot of the company. He is assisted by Messrs. Hollister and Rushenburg, also experienced pilots.

A plane of the side-by-side dual control type is being used for instruction work. Flying is done at the Aberdeen Airport, which has two fine half-mile runways. Liberty, Hispano-Suiza, Curtiss, Mercedes, and Gnome engines are used in the teaching.



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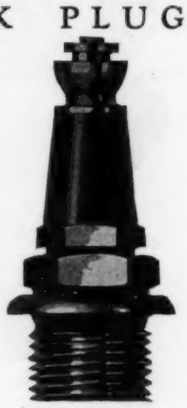

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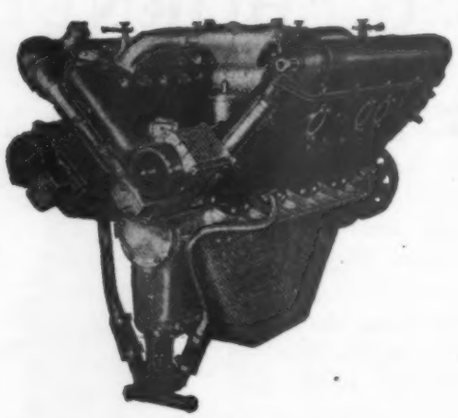

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Aviation in Brazil

Continued from page 837

substituted for steamers on the section between Porto Praia and Fernando do Noronha, the trip from France to Rio de Janeiro and Buenos Aires will be 3½ and 4½ days.

The Deutsche Luft Hansa is the second group involved. It has manifested no interest other than that of providing air transportation along the east coast of South America. It operates in Brazil through the Condor Syndikat, with offices in Rio de Janeiro, and its concession from the Brazilian Government permits it to run planes south from the island of Fernando do Noronha to Rio Grande with stops at Bahia, Aracaju, Maceio, Recife, Natal, Caravellas, Porto Alegre and Peletas.

Service between Porto Alegre, Pelotas and Rio Grande was initated several months ago, these three cities are located on the Lagae dos Patos, a tide water lake about 150 mi. long and 30 mi. wide. This service was recently turned over to a newly organized firm, the Empreza Viacao Rio Grandense, in which the principal stockholder is Bromberg & Cia., a strong German trading company operating in Brazil. The new company is building an airport at Porto Alegre, on the Ilha Grande dos Marinheiros, distant a few minutes from the city. A Junkers O 24 seaplane is being used for the service. It is planned to use a Dornier Mercur, a small land plane, between the coast and the interior of the state of Rio Grande do Sul.

The tariff of the service in operation has recently been reduced to encourage traffic. The trip from Porto Alegre to Rio Grande requires three hours and the fare is about $23. Mail and express are also carried. Letters weighing up to 20 grams pay about $0.28 and packages per kilo about $0.37.

The Condor Syndikat has for its service along the coast two Dornier Wal seaplanes. One is in Rio and the other in Recife. Two super Dornier Wal hydroplanes were due to arrive at Rio in Nov., 1927. The company is reticent in stating its plans for the future.

The third group is the German Zeppelin manufacturers, who plan to inaugurate a dirigible service between Seville and Buenos Aires in October, 1928. Dr. Hugo Ekener is president of the company, which is called the Sociedad Colon Transaera Espanola, and which has been given a concession by the Spanish Government granting exclusive rights of air navigation between Spain and Buenos Aires for 40 yr.

The company plans to use dirigibles with a minimum capacity of 40 passengers and ten tons of general cargo. The service will be monthly and will include several stops in Brazil.

Another group in which the manufacturers of Junkers airplanes were interested has withdrawn from the field, in order not to compete with the Condor Syndikat.

Among those interested in commercial air transportation may be included the Empreza Aerea Brasileira, located in Rio de Janeiro. This company, organized to operate airplanes for sightseeing, advertising and other allied purposes, in Rio de Janeiro, has only two Handley Page seaplanes (Norman Thompson three passenger type). One plane is undergoing repairs and the other has not been mounted.

A service between Para and Manaos on the Amazon River is proposed. The distance between these two places is roughly more or less the same as between New York and Chicago, and the trip up river by boat averages four to seven days, with a little less time coming down. Such a service probably would have to be subsidized in the beginning.

It is rumored that Bolivia is interested in extending her airplane lines to Manaos. At present, two routes are followed in the southern part of Bolivia, one connecting Cochabamba with Santa Cruz, and the other in the north linking Riberalta with outposts in Peru.

FOREIGN NEWS

By Special Arrangement with the Transportation Division Bureau of Foreign and Domestic Commerce

Czecho-Slovakia a Leader in Aeronautics

Since the close of the war a great development in aviation has taken place in Czecho-Slovakia. With decidedly small funds the air service has been enlarged and Prague, the capital of the country, has become an international center of aviation.

Up to the close of the war Czecho-Slovakia had one single flying field but today it is in possession of 14 of the most modern airports. It has four factories for the construction of planes, four for the building of engines, and two aerial stations for the communication of weather conditions.

In military aviation, Czecho-Slovakia has three corps, one academic school for aviation, and four aero clubs. President Masaryk is an ardent aeronautical enthusiast.

Canada Reports Rapid Progress

Rapid progress in aviation throughout the Dominion of Canada is indicated in a compilaton of the records of all civil flying organizations which has just been completed by the Civil Aviation Branch of the Department of National Defense.

The compilation which will form part of the annual report of the Air Force for the year 1927 shows that the number of organizations flying at the present time has now reached 21, as against 16 in 1926 and 10 in 1925. The total number of hours flown by registered aircraft during the year was 12,070, over twice as much as in 1926 and three times as much as in 1925.

Augment Skadka Service in Colombia

Skadka, the German air service in Colombia, South America, has now extended its air lines in that country over an additional 900 mi. This distance is flown for the greater part over open water from Barranquilla to Buenaventura off the West Coast of Colombia. The new line is being travelled once a week, and the distance is being covered in nine hours.

This, the second air line to be established in Colombia, connects all the larger towns of the West Coast, extending from Barranquilla via Cartagena, Turbo, Santata, Quibdo, and Istima to Buenaventura.

Plan Pilgrimages to Mecca by Airplanes

Change in an aged custom is indicated in reports from Bombay, India; for it now develops that devout Moslems plan to make their pilgrimages from Hedjaz to Mecca, the Holy City, in airplanes rather than on camels, the method of transportation honored for centuries. The project, which calls for flights from Jeddah, the Hedjaz port, is understood to have received the approval of Ibn Saud, Mecca's new ruler.

Citizens Give Soviet Union 100 Planes

In answer to a preparedness campaign of the Osaviakim, Russia's society for aviation and chemical warfare, various organizations throughout the Soviet Union have raised funds and purchased military airplanes. The last 15 of 100 planes called for were presented to the Union in a recent Moscow celebration.

German Air Line Business Nearly Double

Air Service has brought good results for Germany for the fiscal year of 1927; for more than 100,000 passengers were carried against 56,000 in 1926. The distance covered by the German air service was 9,000,000 mi. against 6,000,000 the previous year.

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Side Slips

By ROBERT R. OSBORN

Mr. R. M. M. sends along a very interesting clipping from the Bureau of Aeronautics News Letter of March 7, 1928, from which we take the liberty of the following quotation—

"It has recently come to the attention of the Bureau that a scientist has located a fly which seems to hold the World's speed record. The 'Deer-Bot' Fly, according to the scientist, attains a speed of over 800 m.p.h.

"It is contemplated placing an order for one of these flies in the near future to be flight tested, as it might be possible to incorporate some of the performance data in our newer types of planes. It would be of great interest to know how the scientist managed to record the speed. No doubt he laid out a timed course and trained the fly to make an up and down wind run on the course. The question as to whether or not this speed was attained with or without a preliminary dive is also of importance."

• • • •

Possible conversation between a couple of "Deer-Bot" flies—

First Deer-Bot Fly—"What was that last flash underneath?"

Second Deer-Bot Fly—"There was a lot of shooting, so it was probably Central America. However, if we're off our course it might have been Chicago."

First—"Well I think I'll land at the next continent as I'm not revving up properly. I'll bet I'm not making over 700 m.p.h."

Second—"The next place will be Australia, so I'd advise against landing there. There's a danger of over-shooting these small continents. I tried to get in there a few weeks ago and had to go around the World twice before I dared set down. Had to stall in at 400 m.p.h., for a perfect eight point landing. However, try it if you want to."

• • • •

It would seem to be in order to suggest to Colonel Lindbergh that before he presents his invaluable Ryan monoplane to the Smithsonian Institution, he receive assurance from the officials that there will not be placed in front of it on exhibition a Curtiss "Jennie" with a placard stating "In the opinion of many competent to judge, this was the first heavier-than-air craft in the history of the world capable of a non-stop flight from New York to Paris carrying a man."

• • • •

The latest editorial deploring on the subject of aviation comes from the Pacific Coast and states that there is a grave danger of forest fires being started by lighted cigar and cigarette butts being thrown from airplanes. We are sure we could reply adequately in defense of both the airplane and Lady Nicotine but should like to turn our proxy over to more capable and experienced hands, Jay E. House, esteemed Columnist of The New York Evening Post, The Philadelphia Ledger and other papers. Mr. House has been proving for years that no cigar or cigarette butt ever started a fire, by his custom, throughout thirty years of newspaper work, of throwing thousands of lighted butts into the waste-basket full of newspaper clippings alongside his desk, without arousing as much as a wisp of smoke.

• • • •

A new airplane is reported to be in the process of building for Colonel Lindbergh, which will replace the "Spirit of St. Louis" when it is consigned to the Smithsonian Institution. According to the news items this will be "the swankiest airplane ever built", and all parts, including the entire engine will be nickel plated. May we not suggest the name "Spirit of St. Nickel" as appropriate for the new ship for our aeronautical Santa Claus?

AIRPORTS AND AIRWAYS

Baltimore, Md.

By Harry Rudo

After months of consideration, a water front site for the Baltimore airport has been decided upon and plans have been formulated by the Airport Commission of Baltimore. The land comprises a tract of 650 acres with a possible extension to 1000 acres. Approximately one-third of this land is submerged, and therefore it will be necessary to build a bulkhead 900 ft. in length and create fast land behind it. The cost of the land will be approximately $1,000,000, bulkheading and filling in, $2,500,000, and with buildings, the total cost will be about $4,000,000. Of this amount $1,500,000 is available immediately by a loan floated by the city. Work on the project will be begun shortly. Lindbergh Field has been the name decided upon.

At first the selection of a field was the paramount object of the commission; but it was later decided that a field especially suited for the manufacture of land and seaplanes should be selected, therefore a field of this size was selected. It will be the largest combined sea and land airport on the Atlantic Seaboard and will compare well with others in the United States. It will be in the Department of Commerce triple "A" airport class. Three runways will be laid out, 5,440, 4,400, and 3,600 ft. in length, and each 500 ft. in width.

The tract is in eastern Baltimore, is situated adjacent to Logan Field, and borders the Patapsco River. Both the Baltimore and Ohio and the Pennsylvania Railroad tracks run close by, as well as a street car, and excellent boulevard; also, there is fast boat service. It is within 20 min. drive of the post office, thus making it admirable for the air mail. Geographically, Baltimore is the logical terminus for a North to South America air service, it is said; and because of its proximity to Washington, this port may be used as the terminus for naval seaplanes.

It is at this new airport that the Glenn L. Martin Co. will locate its new plant.

St. Louis, Mo.

By M. L. Alexander

Although Lambert-St. Louis Field is still heavy from the late winter thaws, work is going ahead on the preliminary steps toward its development as a first rank flying field. The Wabash railroad has completed the switch to be used by the manufacturing plants of the B. F. Mahoney Aircraft Co. and the Curtiss-Robertson Aircraft Co., and the foundation has been laid for a macadam road paralleling the Wabash tracks.

Ground was broken recently for the Curtiss-Robertson plant. William B. Robertson, president of the concern, announced that the factory, to cost $75,000, will be completed within 60 days.

Work is proceeding rapidly on the development of the new 100 acre flying field at Cahokia, just south of the east end of the free bridge, which is to be operated by the Parks Airline. Two two plane hangars are in course of construction and a 10,500 gal. gasoline tank has been installed on the field, which is on the hard road within 20 min. motor ride of the downtown St. Louis district. The Parks concern plan two large hangars, in addition to the present structures, a small restaurant and a classroom for students.

Equally comprehensive are the plans of the Von Hoffmann Aircraft Co. for the development of its school. Plans for construction of a new concrete floor hangar have been made and the company is awaiting the assignment of space at Lambert Field before beginning construction.

Capt. H. H. Young, regular Army instructor of the 35th Division Air Service, brought in a new O-11 Falcon from the Curtiss plant at Buffalo, N. Y., recently. He and Mast. Sergt. Oscar Weisz made the jump from Buffalo to Rantoul in 7 hr. 15 min. against a spanking headwind.

Dr. William Donovan, who, as "Tiger Bill" Donovan, one of the fleetest backfield men in St. Louis University history, has been appointed flight surgeon of the 35th Division Air Service, with the rank of captain.

Philadelphia, Pa.

Four more Waco 10's, with OX-5 engines, have been sold to J. Allison Buck of Wilmington, Del., an airplane dealer in that section, by the Ludington Philadelphia Flying Service. R. Sanford Saltus, Jr., vice president of the Ludington company, has also announced that five new Wacos have arrived in South Philadelphia from the Advance Aircraft Co.'s factory at Troy, O.

The four planes purchased by Mr. Buck follow close on the heels of another Waco 10 he purchased recently from the Ludington company. All five planes have been delivered.

The Aero Club of Pennsylvania, one of the oldest organizations of its kind in the country, was host to William B. Stout, president of the Stout Air Services, Inc., of Detroit. at a dinner given in his honor at the Bellevue-Stratford Ho-

Crowds gathered at Philadelphia's airport the night following the take-off of Capt. Walter Hinchliffe and the Hon. Elsie Mackay from Cranwell Airport, England. It had been rumored that the ill-fated British fliers planned to land at Philadelphia.

tel. After the dinner, Mr. Stout spoke before a special meeting of the club, held at the City Club on South Broad St.

Among those at the dinner were Mr. Stout, Hollinshead N. Taylor, club president; R. Sanford Saltus, Jr., first vice president; W. Laurence LePage, secretary; Paul Thomas, assistant secretary; Maj. J. Sydney Owens, commanding the 28th Division Air Service, P.N.G.; Lieut. Comdr. Ralph D. Weyerbacher, commanding the Naval Aircraft Factory at the Philadelphia Navy Yard; Edward G. Budd, an aviation enthusiast and a prominent manufacturer of Philadelphia; and Secretary Billin of the Engineers Club of Philadelphia.

Mr. Stout told the club, after the dinner in his honor, that

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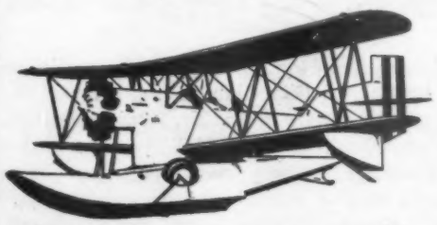

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he would extend his Detroit to Cleveland air passenger service, using tri-engined Ford planes, to Philadelphia late this summer or fall. The company's original plans were to extend the service here in not less than eighteen months. The service will be extended from Cleveland to Pittsburgh this spring, Mr. Stout said.

Pittsburgh, Pa.

By Ray A. Tucker

Clarence Chamberlin, trans-oceanic flier, recently stopped here for the opening of the Aeronautical Exhibit, sponsored by the McKeesport Chapter of the N.A.A., in the Penn-McKee Hotel. A dinner was held that evening in the hotel in his honor. Moving pictures were shown of several important flights. Other honor guests were Mayor George H. Lysle of McKeesport, Pa.; James F. Woodward, state secretary of internal affairs; State Senator W. D. Mansfield; Representative John A. Rhodes; and Congressman Clyde Kelly.

Robert H. Hancock, chief mechanic at Rodgers Field, the Pittsburgh airport, has just opened a ground school where complete courses in every phase of aeronautics except actual flying is to be taught. During the war, Hancock served in the U. S. Army Air Service, being in charge of machine shops at one of the principal Army flying fields.

The Aero Club of Pittsburgh has announced its plans for holding its Third Annual Boys Model Airplane Contest at Rodgers Field Saturday afternoon, May 26. The contest, which will be divided into two parts, is open to any boy under 18 yr. of age.

Many valuable prizes will be awarded for both the Duration Race, in which flying models are to be entered, and the Model Contest, in which amateur reproductions of planes will be exhibited to be judged according to their technical merit, appearance, and construction.

President Robert E. Dake of the Aero Club has appointed the following to handle the contests: John F. Feery, chairman; Raymond M. Marlier, Boy Scouts division; George E. Dickson, contest details; James C. Boudreau, school division; and Christopher J. Evans, trophies.

Hazleton, Pa.

Warm weather and increasing interest in aviation having spurred airplane sales, William H. Veale, president of Veale Aviation, Inc., announced recently he has ordered 16 additional Challenger planes from the Kreider-Reisner Aircraft Co. of Hagerstown, Md. The Challenger is a three place, OX-5 plane.

Mr. Veale also announced the recent sale of a Challenger to Dennie G. Mock, of 1019 Washington St., Huntingdon, Pa., and to George Zinn, a student and employee at Pitcairn Field, Hallowell, Pa.

Palm Springs, Calif.

By Johnny Hammond

Adding a new field to the long list of airports in this section, Palm Springs has recently opened the new "Steven's Desert Airway" with an aerial dedication ceremony in which more than a dozen Army, Navy, Marine Corps, and civilian planes were the honor participants with a large crowd.

Prescott T. Stevens, pioneer landowner and sportsman of Palm Springs and Hollywood, is the founder and donor of the desert flying field after whom it was choicely named and christened. C. W. "Bill" Seaton, former Army Air Service pilot, now associated with Riverside Airport and who engineered and assisted in laying out the new field, is the sole operator and maintainer of the port, using International F-17's for commercial work.

Those who participated in the airway opening were Lieutenants London, Twining, Bevans, Plummer, Taylor, Adams, Weddington, Berner, Tindell, Tonkin, and Schramm of March Field and North Island, flying DH's, Whirlwind PT's, and

Voughts. Of civilian planes and pilots were Roman C. Warren, Riverside Cowboy-Flier with a TM Scout, Lieut. Paul H. Richter, Fokker Universal, and Lee Shoenhair, Menasco Salmson-Stearman, both of Los Angeles, and Mr. and Mrs. F. L. Ames, Whirlwind Travel Air of Boston Airport, Mass., and numerous others.

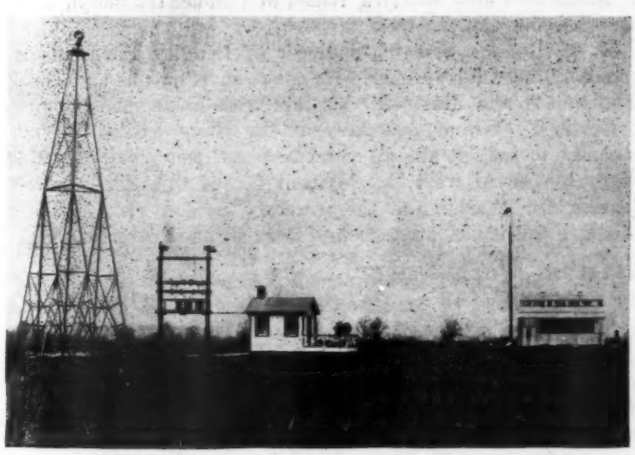
Steven's Airway is nearly a half mile in length and more than 500 ft. in width affording a smooth water-leveled sandy runway which is adequately drained. It is well marked with circle and lettered wind cone and is bordered with white posts.

Lansing, Mich.

By Hayden Palmer

From a mere pasture of a year ago has sprung up the Capitol City Airport here, equipped to receive and care for fliers, already recognized by the Department of Commerce on its airway maps. Although activities at the field have been confined largely in the past to passenger hops with a few cross-country flights, it is believed that the coming summer will witness some unusual activities of both local and outside fliers.

The installation of new lighting equipment recently has added greatly to the possibilities of the field, and many fliers who have shunned Lansing previously will be drawn here by this added facility for night flying. The new equipment is quite complete, consisting of a large Sperry revolving beacon light with the automatic bulb changer, two Sperry high intensity arc floodlights, and a set of 46 boundary lights, including 30 white or clear lights, 13 green, or approach lights,



Michigan has a well equipped field in the Capital City Airport at Lansing. Photo shows the 80 ft. tower with its Sperry revolving beacon, the floodlight control house, hangar, and other equipment.

and three red or obstacle lights. A number of obstacle lights had already been installed by the city previous to ordering the main set.

With two graded runways, one 3000 ft. and one 2100 ft. long, one large hangar, and another to be built in the near future, a fueling station, telephone, and other minor facilities in addition to the lighting system, the Capitol City Airport is well equipped to care both for air mail fliers and other commercial airmen as well as those flying for pleasure.

An improvement program is also planned for the summer which if carried out will bring the Lansing field up to Class A rating according to Department of Commerce specifications.

Ann Arbor, Mich.

With the authorization to spend $1,000 for preliminary work on runways and other improvements, the municipal airport of the City of Ann Arbor will soon be a reality. The Steere property, a few miles south of the city, will be developed into a first class landing field with equipment for caring for transient planes, landing of mail planes, and ser-

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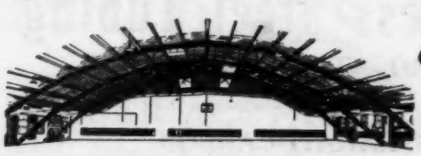

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vicing local planes. Cinders are to be placed in the runway areas as soon as weather conditions permit this month. A revolving beacon and special lighting equipment will be installed this summer. A special committee comprising H. H. Atwell, Horatio J. Abbott, Paul Wagner, and Eli Gallup, park superintendent, will have charge of the development of the new airport.

Detroit, Mich.

By John T. Nevill

Harry Hammill, chief pilot of Skully Airways, recently announced the acquisition of Dennis Taylor, Detroit transport pilot, on the instruction staff of the airways school. Taylor entered commercial aviation as a pilot in 1918. He later organized and operated the Blue Bird Flying Circus, which toured the South and Middle West for a number of years.

Officers of the Humming Birds Club, an organization of 21 members who are studying aviation through the group plan to become pilots, were recently elected. They are Cliff R. Wilson, president; Frank J. Trella, vice president; John Williams, recording secretary; and Harold Sodurland, treasurer.

Six commissioned and non-commissioned officers of the 107th Observation Squadron, Michigan National Guard, recently flew to Grand Rapids to attend the annual Kiwanis banquet, which was held in honor of headquarters company, 126th Infantry. Those making the trip were Maj. Floyd E. Evans, Capt. Carl B. Squier, Lieut. Harold E. Mensch, Lieut. Walter E. Nichol, Sergt. Lucian F. Barr, and Sergt. Daniel J. Burgan. Philip R. Love, friend of Colonel Lindbergh, also attended the dinner.

K. M. Ronans, research engineer of Langley Field, was a recent Flying Club speaker. He spoke on "Controls and Their Functions", and illustrated his talk with plane models.

Curtis D. Wilbur, secretary of the Navy, visited Detroit recently to inspect the all-metal airplane being built for the Navy by the Aircraft Development Co. of this city. Before leaving for Washington the secretary paid a visit to Ford Airport and called upon Henry Ford in his Dearborn offices.

Boston, Mass.

By Daniel Rochford

The bill to permit Massachusetts to lease the Boston Airport to the city of Boston for development was defeated in committee in the State Legislature. The Mayor of Boston refused to support the project since it would have meant spending $50,000 a year for 10 yr. A plan to have the cities and towns of greater Boston undertake the work and obligation was suggested by Mayor Nichols, and he has been asked to call a conference of the officials concerned to secure action. The proposal is so vague as to appear fruitless at this writing. The chances of the city of Boston appropriating a smaller sum such as $20,000 for airport improvement and enlarging the runways appear better as Mayor Nichols has appeared willing to do this. A bill to allow such expenditure, (special legislative sanction is required before cities and towns can spend their funds for airports) appears likely to pass the present legislature.

Virginia, Minn.

Flying activities here should receive a boost during the year, for C. H. Sigel has purchased a long wing Eaglerock, to be delivered about the middle of April. This plane was purchased through the Minnesota Aircraft Co. of Minneapolis, distributor for the Eaglerock in this state, who appointed Sigel as the dealer in the Arrowhead country. Inasmuch as there are comparatively few airplanes in the northern part of Minnesota, this means that there is a possibility to sell a number of planes in this section during 1928.

The main drawback at present that is preventing some of the airminded people from buying is the lack of properly

equipped fields with hangar space. It seems however, that Virginia will be favored with the desired facilities this year for the county commissioners have expressed their approval and the city officials are willing to cooperate in securing a desirable site. The property under consideration is about 1¼ mi. from the center of the town and was considered during the war as a possible location for a government landing field.

If the preliminary details incidental to the acquiring of this 160 acre tract are completed, then the numerous tourists visiting this section in the summer will have air service available to the many lakes whenever desired, for Sigel will use his Eaglerock on special trips in addition to giving demonstrations to interested prospects.

Tulsa, Okla.

By Ernest W. Fair

A detailed survey of the route proposed for the Petroleum Air Line from Tulsa to San Angelo, Tex., is being made by a committee, directed by C. C. Herndon, of the Skelly Oil Co. and Herbert Harrison of Wichita Falls, Tex. The line has been approved by the local chamber of commerce. The present plans call for connections with Bristow, Bartlesville, Tulsa, Oklahoma City, Wichita Falls, Abilene, and San Angelo.

H. C. Martin, Virgil Brown, A. E. Warner, and Roy O. Foster of Oklahoma City, with Mayor D. D. Holcomb, Claude Wild, W. E. Yaggy, and Ernest Tucker of San Angela conferred on the project. This route would be 462 mi. long. There were about 30 representatives of different cities at this meeting.

A recent visitor to Tulsa was Paul Braniff of Oklahoma City who made the trip in an OX-5 Travel Air. Ed. King of Tulsa made a round trip to Oklahoma City recently in a Travel Air without any unusual air occurences. Frank Hoover left for Oklahoma City for a business trip in his Stinson-Detroiter.

Williamstown, N. J.

Supported by members of the local chamber of commerce, an aviation club has been organized here to promote the development of aviation in Williamstown and its vicinity. Allen P. Lister, formerly connected with the Pine Valley Flying Field, has leased a 75 acre plot of ground as an airport. Construction of a large hangar is to be started within a few weeks so as to be ready for operations this summer.

The airport also will be used as Williamstown's Municipal Airport and has been so designated. An invitation to aviators to land on and use the field has been given wide publicity by local business men and the chamber of commerce has erected a large sign on the roof of a local garage as a marker for pilots who pass over Williamstown on their way from New York to Washington. The sign bears the words, "This is Williamstown."

Portland, Ore.

By John W. Anderson

Swan Island, which is rapidly being converted into the Port of Portland Airport, will be connected with the mainland by a macadam road in time for the flying circus planned for June by the Aero Club of Oregon, James H. Polhemus, chief engineer and manager of the port, has announced. Work on the huge causeway between the island and the mainland is far enough along so that construction on the road may begin shortly.

Hangars on the island will be built by firms using them according to specifications furnished by the port. A nominal fee covering cost of operation will be charged. The port will install water and lighting systems.

The port commission has denied the Oregon Yacht Club the use of the basin between the island and the mainland. The

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club asked permission to move its moorage and clubhouse to the basin, promising to furnish a watchman for the airport. The commission held that the moorage might hinder use of the basin by seaplanes.

C. O. Lovaas, superintendent of the airport, is now in California inspecting aviation fields.

Willis R. Gregg, chief of the aerological division of the U. S. Weather Bureau, arrived the latter part of March to investigate the need of an upper air weather observation station. Medford, Ore., now has the only station of the kind in the state. Agitation for the observatory was recently started by the Aero Club of Oregon.

John "Ding" Langdon, former pilot for the Rankin Flying Service, Inc., of Portland, came to Portland in his Waco 10 plane for a business visit recently. He now operates a flying school in Walla Walla, Wash.

Joseph A. Hill, president of Hill Military Academy of which Hill Aeronautical School is a division, has started taking practical flying instruction under Lieut. Gordon E. Mounce, chief pilot of the school.

Edward L. Wells, government meteorologist in Portland, is giving meteorology instruction in the Hill school.

Hood River, Ore.

About 400 people recently turned out for the dedication of the Carson Field Airport here. Several planes bringing fliers from Portland participated in the dedication. Hood River declared a half-holiday for the event. The port is named after Lucian Carson, an Army pilot who lost his life in France. Joe Carson, brother of the pilot, was one of the attending Portland fliers.

The field is about a mile southwest of the city and is approximately 1800 ft. by 1400 ft. in size. It will be operated by the local chamber of commerce and the local American Legion Post.

The Portland delegation included Lieut. Oakley G. Kelly and Lieut. Bez Clark in an Army DH plane; Lieut. A. W. Davis and Lieut. Joe Carson in a Mackenzie-Goff Co. American Eagle; Lieut. Gordon E. Mounce, Hill Aeronautical School pilot, in a Travel Air; Capt. Jack Clemence in an Aeronautical Pursuits Corp. Travel Air; and Tex Rankin in a Waco.

Wichita Falls, Tex.

Some 240 acres of land along the Burkbennett Highway, five miles from this city, is now owned by the Wichita Falls Airport Co., Inc., and will be developed into an airport complying with the class A requirements. Reid and Costly, contractors and engineers, have been gathering data and statistics necessary for the construction of the field and are doing this work gratis, according to C. W. Cahoon, Jr., president of the airport company.

In speaking of contractors generosity and cooperation, Cahoon said that in Wichita Falls, engineers, bankers, lawyers, and all others connected with organizing the airport corporation had given their wholehearted support.

Corning, N. Y.

A committee appointed by the Corning Chamber of Commerce and composed for the most part of experienced aviators who saw service in the World War is rapidly preparing a definite proposition which, it is felt, will bring about the establishment of an airport here during the coming summer. The committee, furthermore, expects to make an announcement shortly which will make Corning the aviation manufacturing center in this district.

Several sites for an airport have been tentatively selected, and it is planned to place the suggestions before the Common Council and the people for ratification. Present intentions call for municipal ownership of the field with leasing of rights to private companies.

Glen Cove, L. I., N. Y.

A group of citizens here recently organized an aeronautical club. Sites for an airport are now being considered by the members, one being a tract of land adjoining the Nassau Country Club. This area would be highly adaptable for such a use, it is said.

Wausau, Wis.

Flying continues at the Alexander Airport here in spite of remaining snow and ice.

John Wood, president of the Northern Airways, recently left for Troy, O., to confer about a shipment of Waco planes from the Advance factory. The demand for Waco 10s has taken all that the Northern Airways had in storage, and orders are now on hand for at least ten more.

Recently, the Midwest Airways Ryan Brougham flew in from Milwaukee carrying a group of Milwaukee bankers to a noon-day meeting in Wausau.

Ben Alexander, who has been instrumental in developing the Alexander Airport, has just purchased a Waco 10 powered with a Whirlwind engine from Northern Airways. The plane will be entered in the Ford Reliability Tour and piloted by John P. Wood, who placed fourth last year.

Burlington, Wis.

The first steps towards securing a permanent airport near Burlington were taken recently when the Burlington Aircraft Corp., operated by H. W. Schenning and Art. Rein, leased a 50 acre tract of land just south of the city. It is planned to build hangars this month so that they will be ready by April 10.

Both Rein and Schenning are spending a month in training quarters at the Alexander Aircraft Co. The Burlington Aircraft Corp. will distribute Eaglerock planes. Special air excursions will also be scheduled at Burlington, and an airplane taxi service will be operated.

Marshfield, Wis.

With the purchase of two American Eagle planes, Max Berghammer, local aviator, is preparing for the flying season. He plans to utilize the two new planes in commercial flying, including passenger service and the training of students. Mr. Berghammer also contemplates establishment of an agency for the sale of American Eagle planes.

Toledo, O.

By David B. Hoag

H. L. Callahan returned to Toledo recently from Chester, S. C., with a Waco 9. The plane has been purchased by Lyell K. Lewis and will be operated as one of a fleet of three planes flown by the newly formed commercial flying company known as Sky-Way, Inc.

A large sign is to be placed at Port Clinton, O., for the guidance of aviators. The National Chamber of Commerce will erect the sign with the assistance of the Port Clinton Kiwanis Club.

The city of Lorrain, O., will accept the advice of the U. S. Aeronautical University relative to the establishment of an airport in that city, according to a recent announcement by Mayor J. C. Staden. J. E. Cassidy, director general of the university, will send a representative to Lorrain immediately.

Hartford, Conn.

The Connecticut State Board of Finance and Control has taken an option on the former Morton F. Plant estate at Groton as a proposed airport site in conjunction with the projected four-day trans-Atlantic steamship service. Portland, Me.; Providence, R. I.; and Montauk Point, L. I., N. Y., have also been suggested as terminal points for the line with which airplane services is planned to cooperate in schedule.

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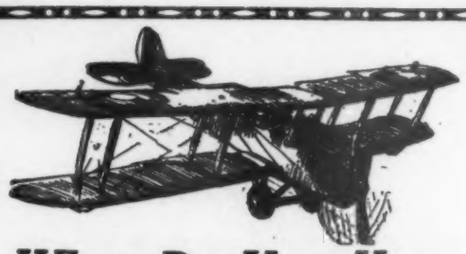

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UNITED STATES AIR FORCES

Army to Make Aerial Survey in Florida

An aerial photographic detachment recently left Bolling Field, Washington, D. C., for Florida where an aerial map of the eastern and southern coast of that state will be made for the Coast and Geodetic Survey.

The detachment consists of Lieut. Julian S. Dexter, pilot and photographic officer, Mast. Sergt. Andrew Matos, photographer, and Pvt. Irving Kallmyer, mechanic. The airplane to be used is a Loening Amphibian similar to those used on the recent Pan-American flight. It is capable of operating from either land or water which makes it particularly adaptable to this type of work.

The aviators will photograph a strip approximately 10 mi. wide along the East Coast from Flagler Beach to Jupiter Inlet, a distance of nearly 200 mi., which contains the widest portion of the Indian River, and from Miami to the town of Everglades. The total area to be photographed is approximately 2500 sq. mi. This will be accomplished in about six weeks.

Davison and Fechet Pause on Canal Hop

Assistant Secretary of War F. Trubee Davison and Maj. Gen. James E. Fechet, chief of the Air Corps, are in Mexico City, as AVIATION goes to press, awaiting the arrival of another plane to take the place of the Loening Amphibian which was damaged in alighting near Puerto, Mexico recently. Davison and Fechet were on their way to the Canal Zone in two of these craft to inspect Army air activities there and make a survey of the Zone's aerial defenses.

F. Trubee Davison and Major General Fechet left Bolling Field, Washington, D. C., on Mar. 11 to make the 7,500 mi. round trip to Panama. They were presented with new leather flying coats before the takeoff. Stops were made along the way at Fort Bragg, N. C.; Pensacola, Fla.; Galveston, Tex.; and Tampico, Mexico. Capt. Ira C. Eaker, executive to Mr. Davison, and Lieut. Muir S. Fairchild of Langley Field, Va., are the pilots.

Warren School Students Visit Saratoga

On invitation of Commander Mitzer of the new aircraft carrier *Saratoga*, 60 students of the Warren School of Aeronautics, Los Angeles, Calif., recently visited the great craft as it lay in San Pedro Harbor and were shown over the ship by Lieutenant Commander Ginder. The students found that the trip over this marvel carrier of the Navy's rapidly developing aircraft flotilla was of high benefit to their study of aeronautics.

The *Saratoga* recently passed through the Panama Canal and steamed to California to take her place in maneuvers.

Navy Tests New Life-Saving Suit

Test was recently made of a new safety suit for naval fliers when James C. Clark jumped with a parachute from a DH plane into the Anacostia River at Washington, D. C. Undoing his 'chute before reaching the water, Clark plunged into the river only to bob up immediately after sinking but four or five feet.

The new suit fits the wearer snugly at neck and wrists thus keeping the clothes dry. Shoes are not worn, a pair of light rubber boots taking their place.

Approve Transfer of Corps Test Plant

Approval was recently given by the Senate Committee on Military Affairs to the bill calling for an appropriation of $900,000 to be used in transferring the experimental and testing plant of the Army Air Corps to a permanent site at Wright Field, Dayton, O.

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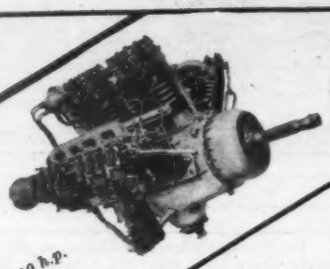
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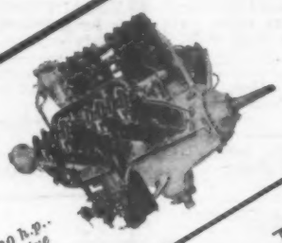
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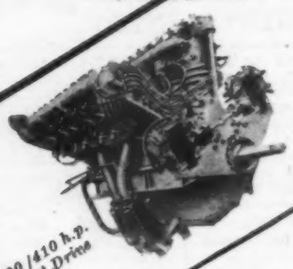
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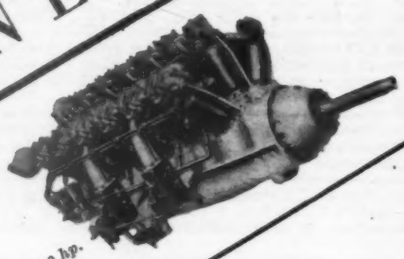
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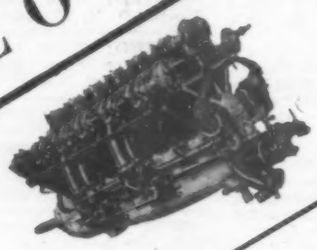
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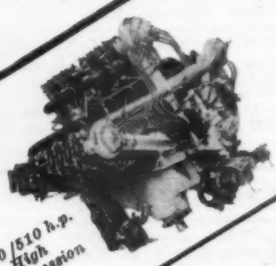
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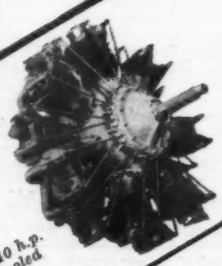
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NOVILLE — NEW YORK to VER SUR MER ~ FRANCE ~ App. 4000 Mi. — MAITLAND, HEGENBERGER — OAKLAND CAL to WHEELER FLD. HAWAII 2400 Miles
SMITH, BRONTE — OAKLAND CAL to MOLOKAI ISL ~ HAWAII ~ 2348 Miles — LINDBERGH — U. S. TOUR 22,350 Miles — GOEBEL
DAVIS — OAKLAND CAL to WHEELER FLD ~ HAWAII ~ 2400 Miles — JENSEN, SCHLUTER — OAKLAND CAL to WHEELER FLD HAWAII 2400 Miles — BROCK
SCHLEE — HARBOR GRACE ME. to TOKIO ~ JAPAN ~ 12,295 Miles — GEORGE HAL
DEMAN, RUTH — ELDER — ATTEMPTED TRANSATLANTIC ~ FLIGHT ~ 2574 Miles
LINDBERGH — PAN-AMERICAN TOUR - 7860 Mi. NEW YORK - MEXICO CITY ~ 2000 Mi. — RUTH
NICHOLS — MAJOR K.M.
LEE, HARRY — ROGERS — NEW YORK to MIAMI FLORIDA 1100 Miles
MAJOR L, — BOURNE
LIEUT, J. F, — PLACHTER
SERGEANT — BELCHER
ANACOSTIA to MANAGUA NICARAGUA 2050 Miles — MIAMI TO NICARAGUA NON-STOP 1200 Miles — LT, — G.C. TOWNER
LT. JAMES — B, McHUGH
CORPORAL — RBT. WENE
ANACOSTIA TO MIAMI ~850 Miles~ — MIAMI to MANAGUA NICARAGUA ~ 1200 Miles ~ — WILMER
STULTZ — C. A.
LEVINE, MABEL BOLL — NEW YORK TO HAVANA 1600 Miles

JN these still early chapters of aeroplane development, the Wright Whirlwind Engine is writing its own history.

From Byrd's trip to the North Pole in 1926 through Lindbergh's flights and on to the records made within the last few weeks, the performance of Wright Engines has been startling enough to sound its name in the ears of the peoples throughout the world.

WRIGHT AERONAUTICAL CORPORATION

Paterson, N. J. *U. S. A.*

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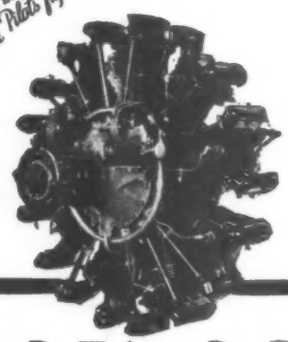

A sectioned Whirlwind Engine will be one of the features at our booth in Convention Hall at the All-American Aircraft Show, April 14-21, Detroit, Michigan.